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Rock Products

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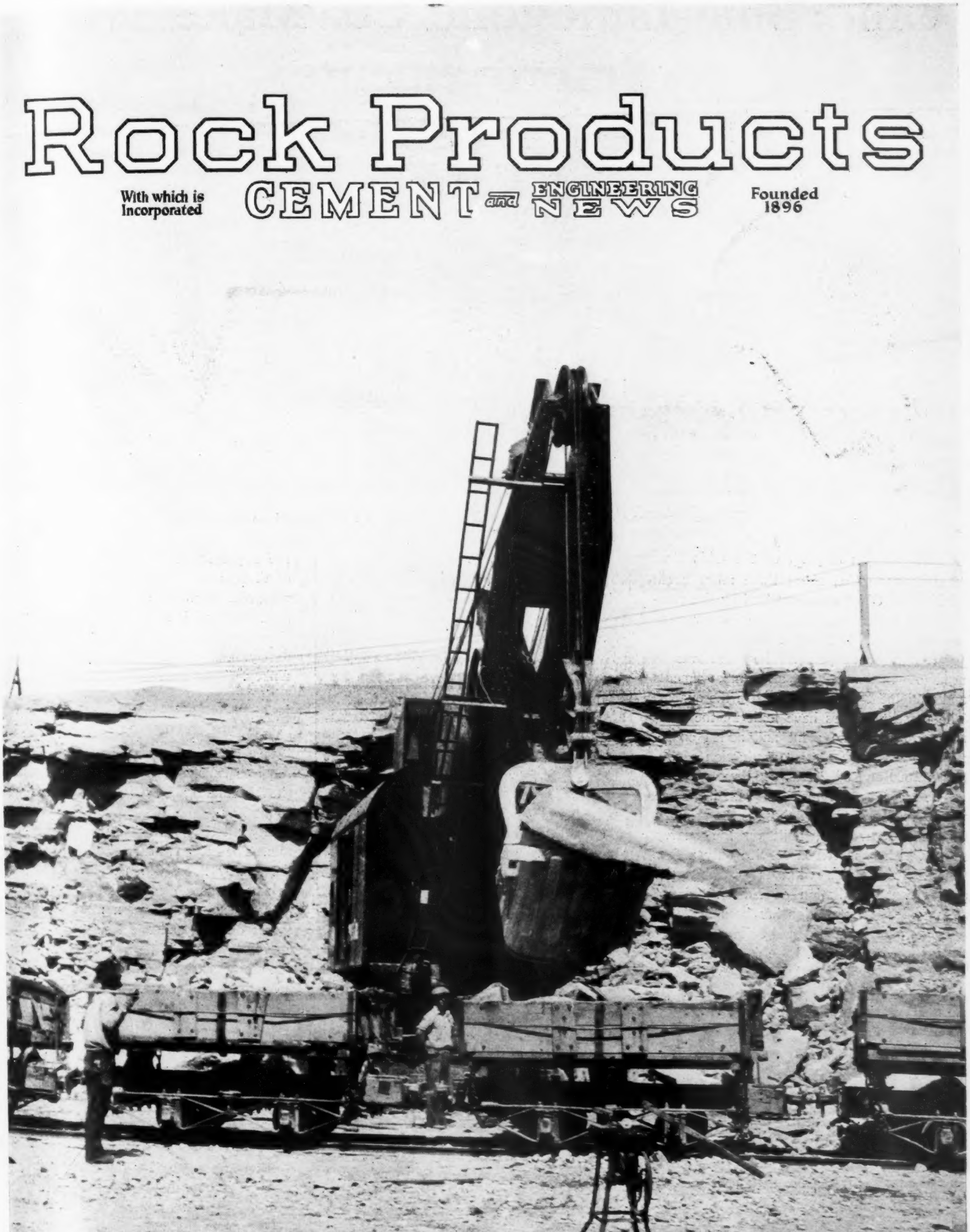
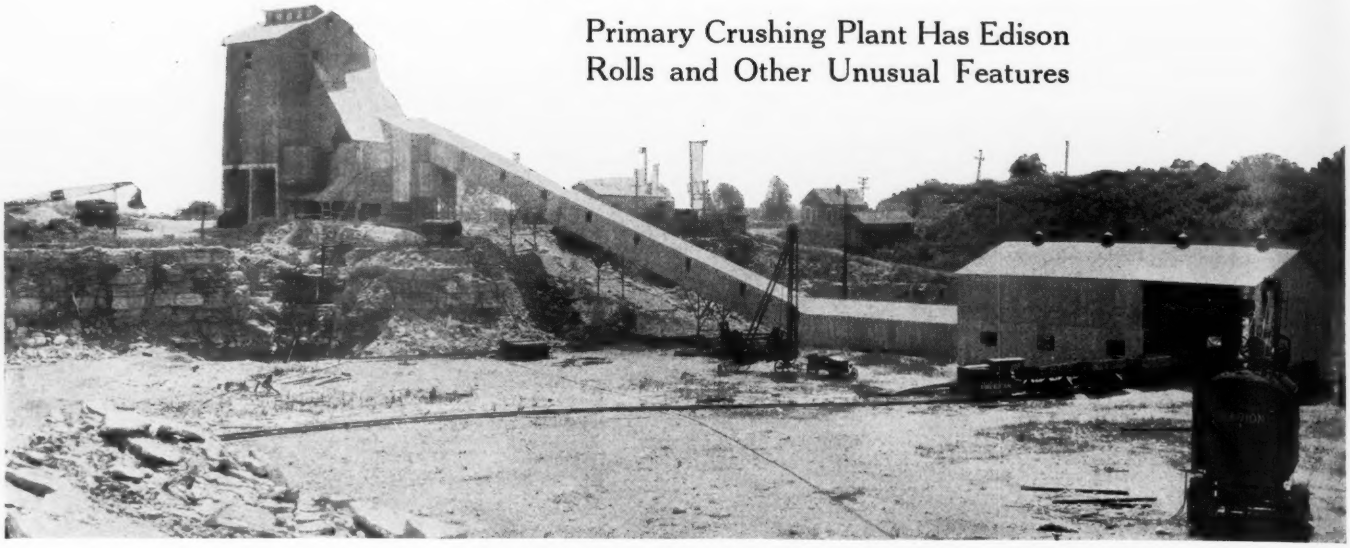


Any slab the steam shovel loads can be crushed by the "giant" rolls of the Ohio Blue Limestone Co.

Ohio Blue Limestone Co. Makes Many Improvements

Primary Crushing Plant Has Edison Rolls and Other Unusual Features



The quarry floor is almost as level and smooth as a concrete sidewalk

THE quarry and plant of the Ohio Blue Limestone Co., about three miles north of Marion, Ohio, were acquired by the company six years ago. Under the former owners the quarry had had a small production for a number of years. The plant was in need of modernization and improvements and equipment were necessary in the quarry. The present owners have built up the business, improved the plant and added equipment to make the present production of between 2000 and 3000 tons per day.

The revised and remodeled plant has some unique features. One of these is the primary crushing department, built on the quarry floor, which has been in service only a few weeks. It contains what is probably the only recent installation of Edison "giant" rolls, and this installation has been made in such a way that many of the former objections to this machine have been removed. There is also an interesting revolving grizzly of the company's own design and make. In the quarry a large electric shovel of one of the latest types has just been put in service, along with new gasoline locomotives.

The quarry was opened in the manner common to the quarries in the flat limestone country in Ohio, that is, a hole was put down to the desired depth and then gradually enlarged to make a more or less circular face. At present the circle is about 600 ft. in diameter. The ledge, for 25 ft. down is much stratified, the layers being practically horizontal and from 2 ft. to less than a foot in thickness. Below this is a ledge of hard, unstratified limestone. It is of excellent quality but no better than the more easily worked, stratified portion above, so operations are being confined to the upper 25 ft., leaving the rock below as a future reserve. A little work has been done on this lower ledge to demonstrate its possibilities and to give data for future working when it is needed.

The rock stands after shooting and the shovel dislodges the upper part with the dipper teeth

Another reason for confining the work to the upper ledge is that the overburden of earth does not exceed 3½ ft. and it is easily removed. Until this year the stripping has been done with a Marion Model 36 steam shovel loading the dirt into cars to be hauled nearly three-quarters of a mile by a steam dinkey. This year the shovel will be used with trucks.

Quarry Practice

The rock is both hard and tough and it requires considerable powder to break to a shovel-handling size. Holes are put down about 10 ft. apart with 24 ft. burden. Practically all the powder is placed in the bottom. The holes are carried only a foot below the quarry floor, which is level and almost as smooth as a cement sidewalk. Owing to the extreme stratification most of the rock comes out in good sized slabs, but little or no block-holing is needed because the rolls can easily crush anything the shovel can pick up and load in a car.

The rock does not move much when the drill holes are fired; in fact, looking at the face after a shot has been fired one would hardly be able to say that it had been shot if it were not that the strata sag in some places. In loading the broken stone, the dipper of the shovel is first set into the rock at a point a few feet below the top so that the teeth lift the rock above this point. Then, as the dipper is withdrawn, the rock falls to the bottom where it can be picked up by the dipper in the usual way.

Two shovels are regularly used in the quarry, the Marion 36, previously referred to (which is used for stripping in the winter) and a new Marion electric No. 490. This is a powerful and heavy machine (it weighs 90

Looking across the circle-shaped quarry at the crushing plant

tons) which is well adapted to the unusual method of loading just described. It has a 2½-yd. dipper and the motors have Ward-Leonard control throughout, so that the shovel man can sit on a stool and control every operation, if he wants to. The shovel can be revolved through a full circle and it is mounted on caterpillar treads.

Following the common practice in the quarries of this district, there is only one track, which runs around the face so that trains go in to the shovel and run by it to go to the crusher house. The cars used are 4½-yd. "Westerns" and they are drawn to the primary crusher by an "American" gasoline locomotive and a Porter steam dinkey. This dinkey is a real veteran for it was built in 1905 and has been doing its full share of work in and around quarries ever since, and as the man who drives it remarked, "She's still a good one." The gasoline locomotive weighs seven tons and it was made by the Hadfield-Penfield Steel Co. It has a specially designed motor made in Canton, Ohio, by the Hercules Motors Corp. Another new gasoline locomotive of the same type and make is to be used with the steam shovel.

The quarry face everywhere is about 25 ft. high

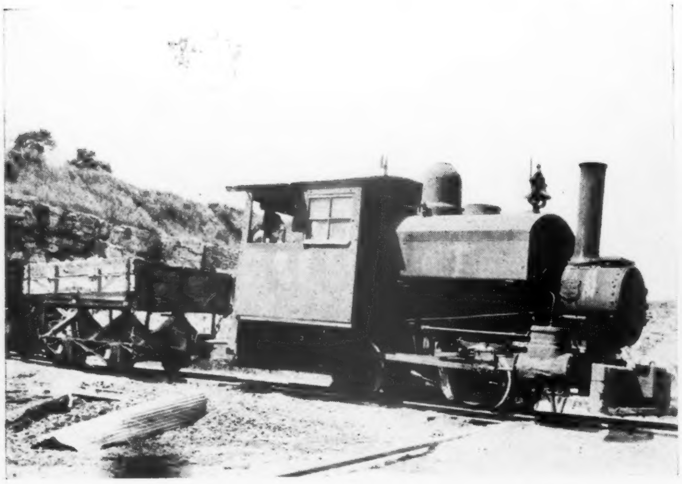
The primary crusher, the Edison rolls already referred to, is set below ground and covered with a building about 60 x 40 ft. The cars pass through openings in one end of the building and each is dumped directly to the crusher as it passes. The rock falls against a curtain of very heavy chains which break the fall and also retard the flow of the rock to the rolls so as to steady the feed.

Special Motors Able to Start Rolls

The operation of the Edison rolls has been often described, but some of the difficulties of this operation are not so well known. One of them is the difficulty of starting. The rolls are very heavy; they have to be since they work by inertia or fly-wheel effect. On account of the great weight, motors of ordinary torque would not start earlier installations of these rolls and it was necessary to use a hoist (or sometimes a rolling hitch of cable and a steam dinkey) to get them to move. When it was decided to install these rolls the engineers of the principal companies making electric motors were consulted to see if it would be possible to install a motor with sufficient pulling power to start them without assistance. The motor finally chosen was a special slip-ring type of induction motor made by the General Electric Co. Each of the two rolls has its individual motor of 150 hp. and the drive is through a 22-in. belt.

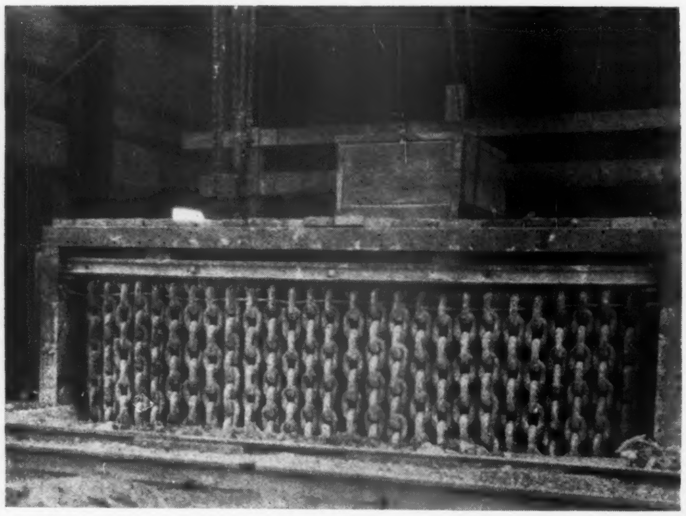
Both rolls do not have to move at the same speed all the time, as with other rolls, for they work in a different manner. One of the rolls is furnished with heavy "sluggers," projections about 4 in. deep. This is the roll that does most of the work as the sluggers bite off pieces of the rock until a piece is reduced to where it will pass the rolls. The other roll has 2½-in. knobs and its duty is to hold the rock against the sluggers on the working roll. Both rolls are 4 ft. in diameter and 4 ft. long. The sluggers and knobs are on renewable plates made of chilled cast iron which has been found

An electric shovel with 2½-yd. dipper loads the quarry cars

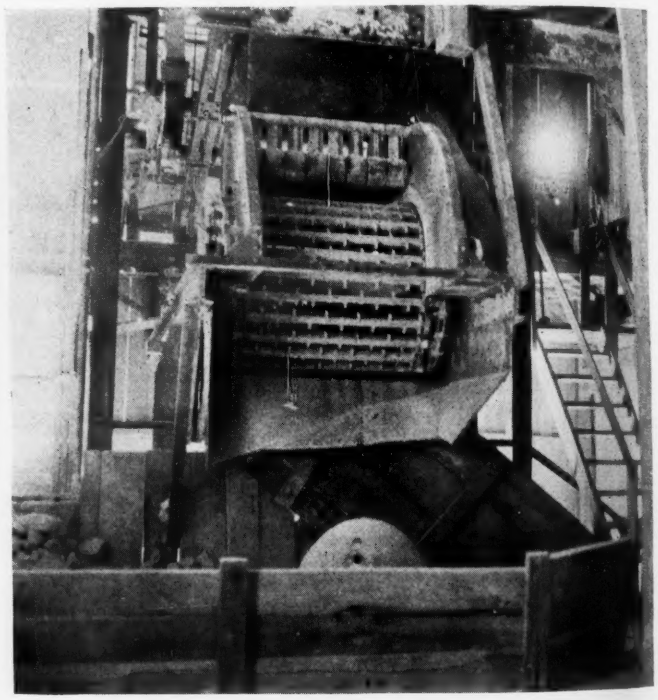


Veteran dinkey, in quarry service since 1905

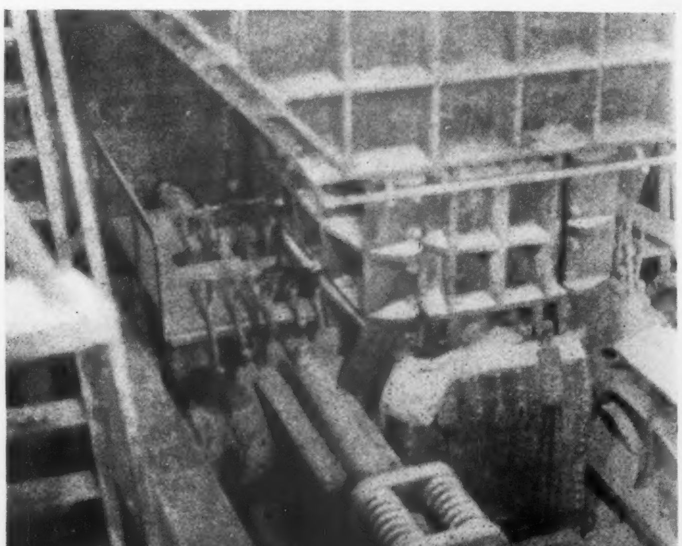
New gasoline locomotive, two of which are in service



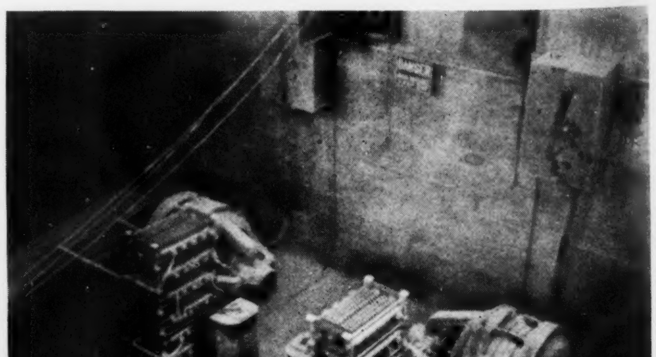
Quarry cars are dumped against this screen of heavy chains



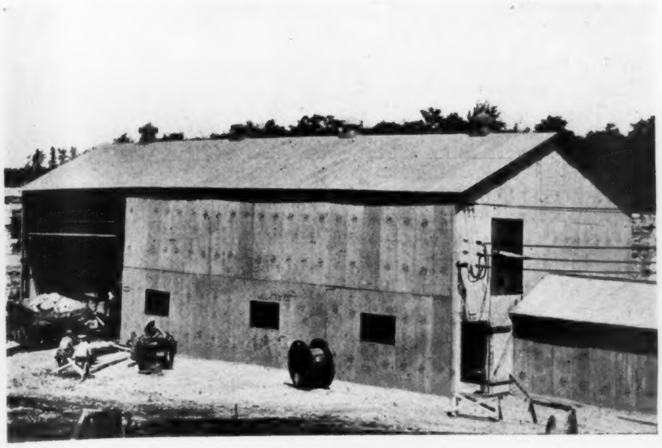
Revolving grizzly under the head pulley of main conveyor



Looking into the pit at the "giant" rolls



Each roll has its independent motor and control



The new primary crusher house

The screening plant and the office

the best material for this kind of work.

All the bearings on these rolls are cooled by oil circulation so that the heat of crushing is absorbed. There is some dust from crushing but this will shortly be taken care of by a dust-collecting system of the company's own design. The fan for this is already in place.

The discharge of the rolls goes to a 36-in. belt of 286 ft. centers which takes it to the re-crushing and screening house. This installation was designed by the Fairfield Engineering Co. of Marion, Ohio. The belt is in a steel gallery covered with corrugated steel sheets. Mellon hydraulic pressed steel idlers with Hyatt roller bearings are used throughout.

The discharge of this belt falls on a re-

Pipe for oil cooling of roll bearings

volving grizzly of the company's own design and make. It is a cylinder, or cage, of manganese steel bars, 2½ in. by ½ in. set edgewise to the periphery, 4 ft. in diameter and 4 ft. long. It is placed parallel with and under the head pulley of the conveyor and revolves in the same direction as the head pulley. The stones strike about the center of the cage and all the pieces that pass through the 4-in. spaces between the bars are chuted off to the boot of the No. 2 elevator. The oversize pieces fall into the secondary crusher, which is a No. 7½ Kennedy of the geared type.

The discharge of this crusher goes to No. 1 elevator, made by the Webster Manufacturing Co., which is 36 ft. high and has 36-in. close-connected buckets. This lifts the discharge to a scalping screen, with 4-in. round holes, which is of 36-in. dia. and 16 ft. long. The oversize goes to a No. 5 Kennedy geared crusher and the undersize goes to the boot of No. 2 elevator. The discharge of the No. 5 crusher also goes to this elevator.

Filter Stone Is Re-screened

This No. 2 elevator (also of Webster make) is of 86-ft. centers and has 36-in. close-connected buckets. It lifts everything that has passed a 4-in. opening, the undersize of the grizzly, the undersize of the scalping screen and the discharge of the No. 5 crusher (which is always reduced below 4-in. dia.) to the two double-jacketed sizing screens at the top of the plant. These are 48-in. in dia. and 24 ft. long and the perforations are 2½ in. and 1½ in. in dia. on the main section, 1 in. on the middle jacket and ½ in. on the outer jacket. All the products (including the oversize, 2½-in. to 4-in.) go to bins except the 2½-in. to 1½-in. size and the ½-in. and finer. Both these go to Hum-mer screens fitted with ¼-in. "Toncap" screen cloth. The 2½-in. to 1½-in. stone is re-screened over a Hum-mer to make sure that it is sufficiently clean to pass the specifications for filter stone, for a considerable part of the output goes to make trickling filters which are being installed for sewage disposal in near-by towns. The ½-in. and finer is screened to make a ½-in. to ¼-in. product and screenings which are sold for agricultural limestone and road dressing.

The motorization of the secondary crushing and screening plant is as follows:

The No. 7½ crusher, No. 1 elevator, No. 5 crusher and scalping screen are all driven by one 100-hp. motor. The No. 2 elevator is driven by a 40-hp. motor, the sizing screen by a 50-hp. motor and the 36-in. belt (of 280-ft. centers) by a 50-hp. motor. All these motors are of General Electric Co. make.

As the plant is in one of the great industrial sections of the United States, a considerable portion of its product is used near-by and is shipped by truck, although the greater part is shipped by rail.

The office of the company is at the plant, Luykins Road, Marion, Ohio, being the post-office address. The officers are: President, W. J. Glenn; vice-president, L. M. Sager; secretary-treasurer and general manager, E. G. Holzhauer. Mr. Holzhauer is very well known in the quarry industry of Ohio as he has been in it practically all his life. He was with the France Stone Co. for about 15 years, before joining the Ohio Blue Limestone Co.

E. G. Holzhauer (left) and L. M. Sager

Eau Claire Sand and Gravel Co.'s New Plant

A Simple Layout for Producing Concrete Aggregates and Material for Special Sands

By Gordon Smith
Consulting Engineer with J. C. Buckbee Co., Engineers, Chicago

THE Eau Claire Sand and Gravel Co. of Eau Claire, Wis., has operated for some years a plant, within the limits of Eau Claire, for the production of washed sand and gravel for general and concrete purposes. The plant also has facilities at this point for the production of filter sands and gravel, blast sand, engine sand and similar specialties.

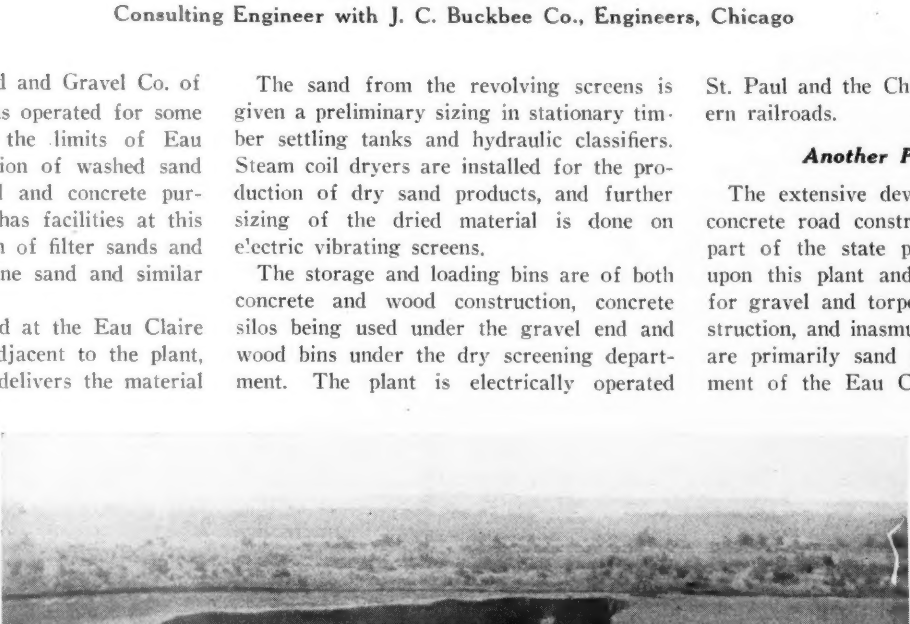
Two pits are operated at the Eau Claire plant. At No. 1 pit, adjacent to the plant, a 3-yd. power scraper delivers the material to a field conveyor, which in turn delivers to a scalping screen. No. 2 pit is near by and in this pit a 3-yd. Monighan dragline excavator digs the material which is conveyed to the scalper screen in dump trucks running on an 8-ft. wide private concrete roadway. The haul is about one-half mile.

The oversize from the scalper is rejected and sent to a small gyratory crusher for reduction, the crushed product being returned to the scalper screen by a 20-in. belt and bucket elevator. The fines from the scalper are carried to the wet screening plant on a 20-in. inclined belt conveyor. Here revolving screens make the various sizes of gravel and sand required for concrete aggregates in the local market.

These deposits run heavily to a highly siliceous sand, which, when graded properly, is well suited for use as filter sand, blast sand, engine sand, core sand and similar products. The plant has been designed for making these specialized products and the company enjoys a considerable business in this line.

The sand from the revolving screens is given a preliminary sizing in stationary timber settling tanks and hydraulic classifiers. Steam coil dryers are installed for the production of dry sand products, and further sizing of the dried material is done on electric vibrating screens.

The storage and loading bins are of both concrete and wood construction, concrete silos being used under the gravel end and wood bins under the dry screening department. The plant is electrically operated throughout, power being supplied by the Northern States Power Co. The water supply for the plant comes from four 6-in. wells drilled to a depth of about 65 ft. The plant is served by a siding and spur track connecting with the Chicago, Milwaukee and St. Paul and the Chicago and North Western railroads.



Looking at the deposit from the washing plant. The hoist house for the scraper bucket is hidden by the upper conveyor

Another Plant Needed

The extensive development of Wisconsin concrete road construction program in this part of the state placed a heavy demand upon this plant and other local producers for gravel and torpedo sand for road construction, and inasmuch as this pit and plant are primarily sand producers, the management of the Eau Claire Sand and Gravel Co. began, about a year ago, to look around for another plant site more suitable for the production of concrete aggregates. After some months of careful investigation and scrutiny of several available sites, an arrangement was finally made to secure a deposit near Chippewa Falls, Wis., and about eight miles from Eau Claire.

The tract of land secured comprises a total of about 200 acres on the bluff forming the south bank of the river west of the city, of which about 125 acres comprise the deposit itself. An abandoned railway roadbed about half way up the bank provided an excellent location for the screening and washing plant and loading bins, and in the layout full use was made of this natural advantage.

The deposit is a practically level plateau extending several hundred feet back from the bluff and at an elevation of 90 ft. above the river edge. Before completing the negotiations which resulted in the acquisition of the property, it was carefully test-holed. The average of the

test-hole pits indicated that the deposit might be expected to run practically 50% sand minus ¼ in. and 50% gravel, with few pieces over 4 in. in size and practically nothing over 8 in. The character of the material was such as to make it suitable for the exacting requirements of the Wisconsin state highway engineers, when properly washed, crushed and sized. The sand was of similar nature to that found at the Eau Claire plant and, when properly graded and prepared, it can be marketed for similar purposes.

As a result of the favorable outcome of the above investigations, and in view of the favorable market conditions for aggregates, the company determined, in the late fall of 1926, to proceed with the construction of the new plant and development of the property. The J. C. Buckbee Co., engineers, of Chicago, were employed as consultants and designing engineers for the new plant, and instructions were given them to proceed on December 28, the plant to be ready for operations in April. Arrangements were made for the necessary railroad siding along the old roadbed with a Soo Line connection at Chippewa Falls.

Scraper Bucket Used

In opening the property, the overburden averaging less than 2 ft. offered no difficulties, and teams and wheeled scrapers were used for its removal. During the first season's operations the use of a dragline scraper was decided upon and equipment which was standing idle at the Eau Claire plant was reconditioned and made available. The scraper bucket is of about 3-yd. capacity and of the "V" type, and it is handled by a 100-hp. Thomas electric two-speed hoist.

The scraper bucket delivers to a reinforced concrete hopper situated nearly level with the top of the deposit. This hopper is arranged in such a manner that in the future steam shovel excavation with car and locomotive haulage may be used without alteration. The hopper opening is 11 ft. wide by 14 ft. long and covered with a grillage of heavy rails spaced on 12-in. centers, thus preventing the passage of any large pieces detrimental to the conveying belts and the plant machinery.

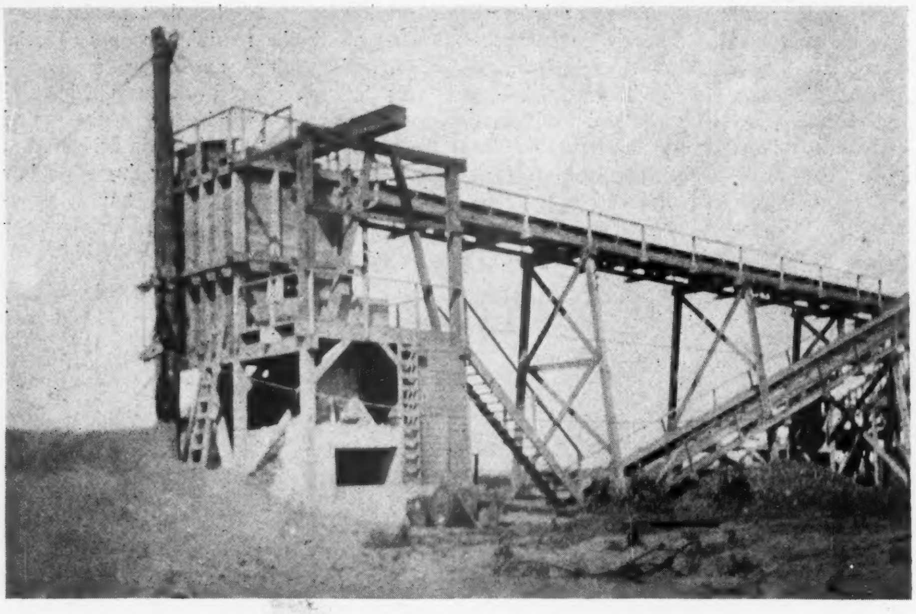
Underneath the receiving hopper a 36-in. wide, self-contained, apron type feeder delivers the material on to the main 30-in. wide inclined belt conveyor leading to the top of the plant. This feeder is chain-driven from the tail shaft of the conveyor through a jaw clutch. The feeder is mounted upon structural steel supports from the hopper floor and provided with heavy steel sideboards and guides to minimize spillage at this point. A counterweighted, swinging, regulating gate controls the amount of material through the feeder and at the same time allows the passage of any large stones which would otherwise clog or jam the feeder.

End of bins and washing plant

The main conveyor is 30 in. wide and about 172-ft. centers, and runs at an incline of about 19 deg. from the horizontal. The conveyor carriers are of the ball bearing type. This conveyor discharges over a stationary bar grizzly about 6 ft. long, having 3-in. clear openings. The material passing through this grizzly is divided into two streams to two 72-in. long by 36-in. by 53-in. diameter conical Gilbert type washing screens having 1¾-in. round hole perforations. The oversize material from the grizzly and the two screens is normally returned to the crusher at the hopper on a 24-in. wide belt conveyor, but provision is also made to deliver this oversize material into one of the loading bins if desired.

The above screens are followed by four similar screens, two having 1¼-in. square holes and two having ⅝-in. round holes. The fine gravel screens having 5/16-in. square openings are of a similar type but 72 in. long by 48-in. and 65-in. diameters. The eight screens are all chain-driven from the ex-

Side of washing plant. The lower belt returns oversize to the crusher



Crusher house and bin for oversize

tended head shaft of the main conveyor. The conveyor head is in turn driven by a 50-hp. motor through a Morse silent chain drive and suitable gearing.

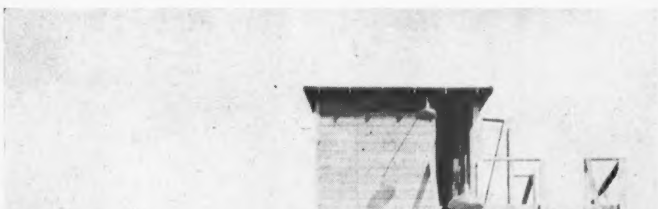
Following the final screens with their 5/16-in. perforations are two pair of 60-in. Link-Belt conical settling tanks arranged in tandem for making two grades of sand, torpedo sand for concrete work and fine sand for plaster work, and, when dried, the special sand products mentioned before.

Advantage Taken of Gravity in Layout

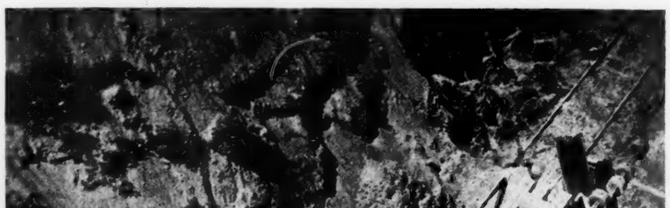
The oversize material from the grizzly and first gravel screens is discharged on a 24-in. belt conveyor about 151-ft. centers, which delivers such material to a crusher feed bin at the receiving hopper. Here a No. 5 Gates gyratory crusher, belt-driven from a 50-hp. motor, reduces this material to minus 1½ in. and discharges directly into the hopper and thence back through the plant. This arrangement of the crusher permits of but one loading point on the main belt, thus minimizing spillage, and at the same time keeps the return belt practically horizontal and permits of a most advantageous use of the gravity feature of the property layout.

The loading bins are of timber construction of the stud and binder type. They are six in number, the overall length being 72 ft. and width 18 ft. Bins are provided for oversize gravel, 1¼-in. to 1¾-in. gravel, ⅝-in. to 1¼-in. gravel, fine or mixed gravel, and the two grades of sand. Nine side-loading quadrant bin gates with hinged spouts are provided on each side for car loading, two gates on each side of the fine gravel and sand bins and one each on each side of the other gravel bins. The gravel spouts are all equipped with rinsing sections.

The structures are of timber on concrete foundations, and the receiving hopper is also of concrete. The plant is provided throughout with comfortably wide stairs, giving access to all points for maintenance and inspection of machinery, spouts, chutes, etc. All stairs, galleries and platforms are provided with 2x4-in. handrails and every provision is made for the safety of the men employed about the plant.



Head of conveyor and washing and sizing screen



Looking down on the screens and sand collecting tanks

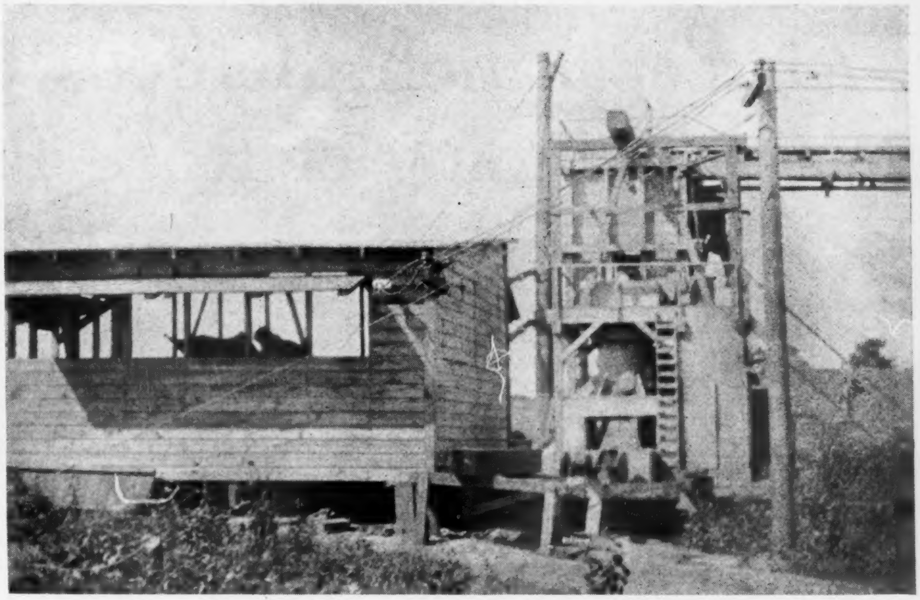
The pump equipment consists of two 5-in. by 4-in. Allis-Chalmers horizontal, split shell, centrifugal pumps direct connected to 40-hp. Allis-Chalmers motors, each pump having a capacity of 700 g.p.m. against 140-ft. total head. These pumps are located at the river edge on heavy concrete foundations and housed in a frame structure. The discharge lines join in an 8-in. main running up the hill under the north loading track and thence along the end of the bin structure to the top of the plant, where the stream is split up to the various screens, loading gates, etc. Ample water is thus available to insure a thoroughly clean product at all times.

The electric power is brought to the plant by the Northern States Power Co. at 13,000v. and reduced in the transformer station at the top of the hill to 460v. for general plant service. All wiring for power and light is in rigid steel conduits. Flood lights are provided throughout the plant at all working points so that operations may be conducted at night when this is necessary to meet the market demands.

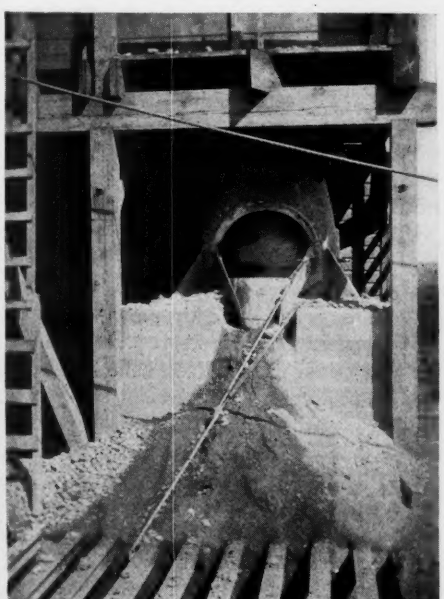
The plant loading trucks are on such a grade that ordinarily cars move past the bins by gravity. The company has, however, a Link-Belt locomotive crane which is used for stock piling surplus production of any size material as made and which may be also used in spotting cars when needed.

Company Now in Advantageous Position

The Eau Claire Sand and Gravel Co. was organized in 1917 and after several years of struggle against odds now finds itself in a prosperous condition with two plants, one of which is brand new and thoroughly up to date and with a satisfactory market for its products. Owen Ayres is secretary and treasurer of the company and its active general manager. J. J. Kelly is president and A. L. Payne, vice president. Other directors are J. B. Fleming and G. A. Rutherford. All the above gentlemen reside in Eau Claire. O. A. Kittelstead is superintendent of No. 1 plant and J. T. Herrick is superintendent of the new No. 2 plant.

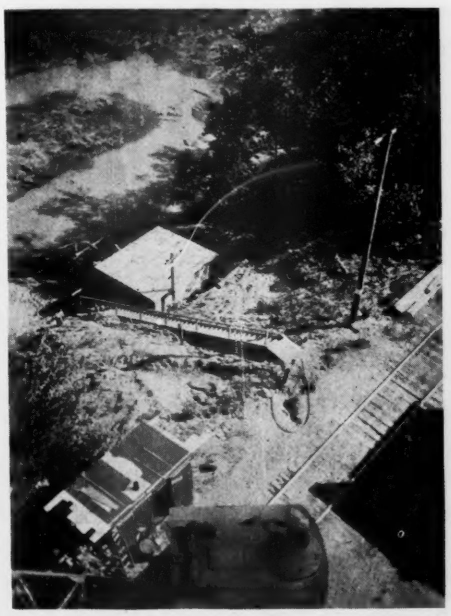


Hoist house and end of crusher house



Crusher discharge and grillage over scraper bucket hopper

The plans for the new plant were prepared by the J. C. Buckbee Co., engineers, Chicago. The conveyor machinery, screens, gates and feeder were furnished by the Stephens-Adamson Mfg. Co.; the sand tanks by the Link-Belt Co.; the crusher, pumps and pump motors by the Allis-Chalmers Mfg. Co.; other motors by the General Electric Co.; the rubber belts for the conveyors and the crusher drive by the Diamond Rubber Co., and the water piping and miscellaneous supplies by the W. H. Hobbs Supply Co. of Eau Claire. The Hoeppner-Bartlett Co. of Eau Claire had the contract for the concrete work, timber work and machinery erection, and the Kelly Construction Co. of Eau Claire the contract for the electrical work.

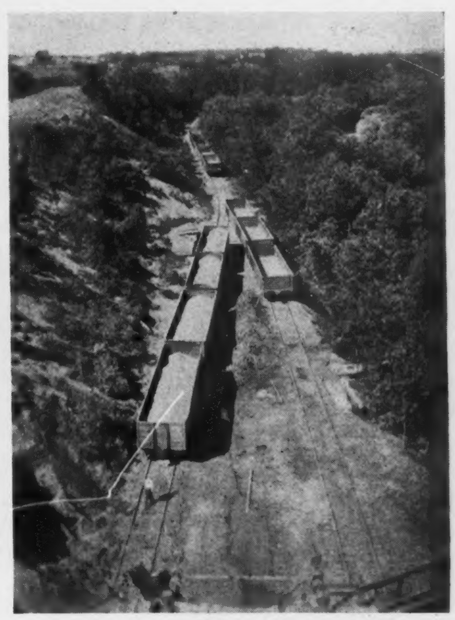


Pump house and plant tracks

To Build Florida Gravel Plant

THE recently organized Capital City Sand and Gravel Co., Tallahassee, Fla., is reported to be planning the establishment of a plant near Bristol, Fla. According to C. L. Waller, vice-president of the company, the company has just bought a dredge at a cost of about $80,000 and other equipment.

Shipments are to be made over the M. & B. railroad at Blonnstown pending the outcome of negotiations with the A. N. railroad. The company has already made contracts to furnish gravel for two big bridges to be built on the coastal highway in Bay county.—*Tallahassee* (Fla.) *Democrat.*



Plant trackage has ample storage for loaded cars

Air Separation Methods Used in Fine Grinding of Rock Products

VI.—Air-Swept Tube Mills and a Special Conical Mill Classifier

By Edmund Shaw
Editor, Rock Products

The Air-Swept Tube Mill

The use of an air current sweeping through a tube mill to remove the finer particles is comparatively new, possibly because the tube mill itself is a more recent form of grinding machine than some others. The idea of turning the tube mill into an air separator is attractive because of its simplicity, but so far as the writer has been able to learn the success of such a method has not been universal. One company which tried it out thoroughly has abandoned it and brought out a special air separator for tube mill products.

The air swept tube mill is one of the few machines that has been studied by a trained investigator. Dr. Geoffery Martin, of London, whose work on the mechanics of fine grinding has finally determined the relationship between the power consumed in grinding and the dimensions of the particles in the product, has also worked with the air swept tube mill. Some fault may be found with the completeness of his conclusions but the tests that he made are interesting in conjunction with the theory of grinding with air separation as a whole.

Dr. Martin employed a small tube mill with a charge of 25 cwt. (2800 lbs.) of steel balls grinding standard Leighton Buzzard sand, which is the British equivalent of standard Ottawa sand, and is of the same mesh size. An air current from a fan was passed through the mill and into an ordinary cyclone collector. The exhaust of the cyclone was the suction of the fan so that fan, mill and cyclone formed a closed circuit as shown in the cut, which is taken from Dr. Martin's paper presented before the British Institution of Chemical Engineers Jan. 13, 1926.

The conclusion given in the paper mentioned is that there is no saving of power from the use of the air swept tube mill except when the rate of feed is very rapid. This conclusion is reached from the results which are given in the table below.

The column headed "With air current" gives the horsepower consumed by the mill *plus* the horsepower consumed by the fan. Only two of the tests show an improvement in the product. No. 4 and No. 6, and the most noticeable improvement is shown in No. 6, in which the reduction of the residue on a 180-mesh sieve from 19.1% to 13.4% may be assumed to be worth the additional 1.18 hp. consumed.

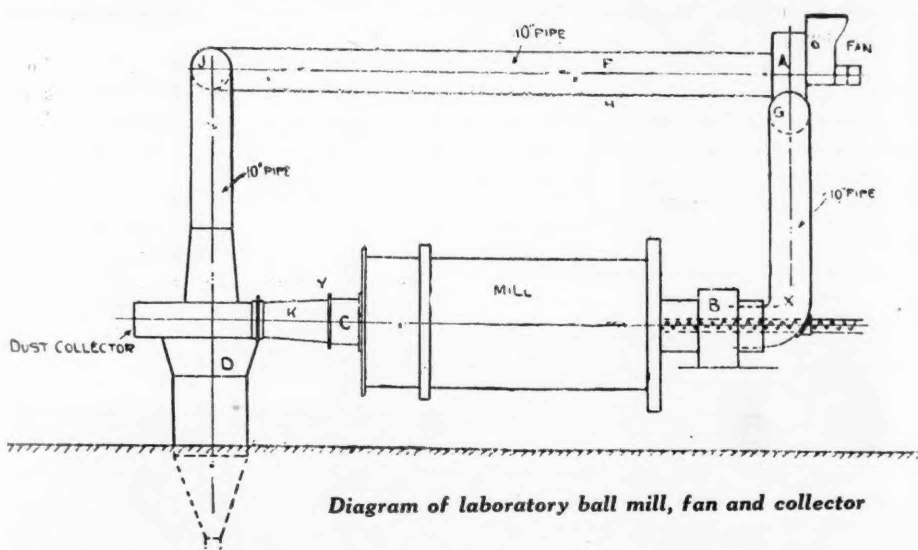


Diagram of laboratory ball mill, fan and collector

The objection may be made that the products finer than 180-mesh do not appear to have been tested for relative fineness. If they had been analyzed by some such device as the air analyzer it is possible that a greater proportion of very fine particles might have been found in the air-swept mill product which would indicate that more credit should be given to this machine than the table gives. But from experiments made in grinding cement on a large scale this would hardly be probable, as the air separated product generally contained less "flour" than the direct product.

To one who is studying the relationship of air separation to fine grinding the results obtained in the 6th test are most interesting. With a heavy feed and a strong air current the air swept mill made the finer product, showing increased efficiency. Assuming that the product was coarser than was wanted, it would have been a simple matter to have returned the oversize portion to the mill as is done with ordinary air separators in closed circuit with a mill, and a different efficiency might have been calculated. The graph showing the relationship between rate of feed and fineness of product (also taken from Dr. Martin's paper) shows that with the ordinary mill, not air swept, the proportioning fineness of the product tends to decrease as the amount fed to the mill is increased. The curve showing this is marked displacement discharge and its upward trend shows that as the feed was increased it is probable that the cushioning effect of the fine product in the mill decreased the amount discharged.

The curve from the air swept mill is a straight line, and it is not unreasonable to suppose that it would have continued as a straight line for a considerable distance. Provided there had been a means of return-

COMPARISON OF RESULTS OBTAINED WITH AND WITHOUT AIR SWEEPING OF TUBE MILL

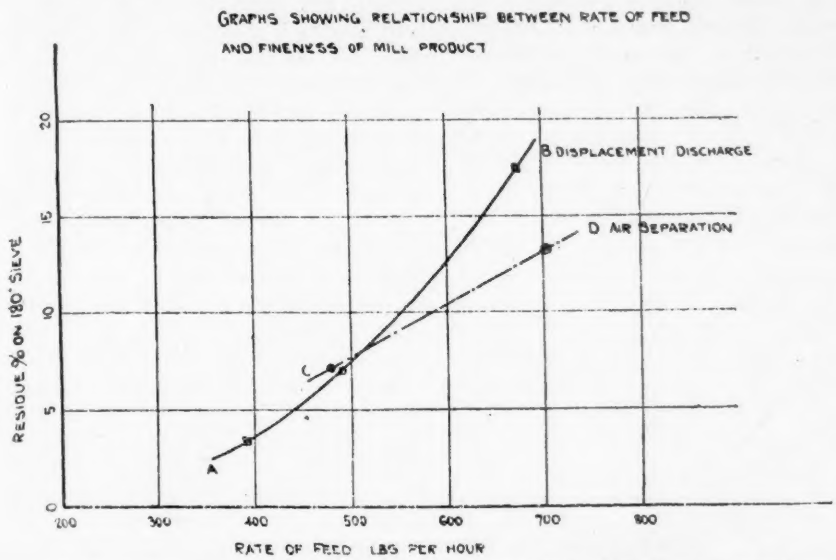
Feed to mill, lb./hr.	Total hp. consumed in grinding		Residue on 180° cement sieve		Speed of air	
	With air current	Without air current	With air current	Without air current	Through mill, f/s.	Through piping, f/s.
(1) 392	8.92	7.70	7.6	3.5	6.00	36.0
(2) 486	9.16	7.88	8.2	6.9	6.02	37.0
(3) 489.3	8.30	7.89	7.4	7.0	4.58	28.6
(4) 485.5	7.98	7.88	5.2	6.8	3.65	22.8
(5) 477	8.37	7.87	7.1	6.6	4.58	28.6
(6) 702	9.14	7.96	13.4	19.1	6.85	42.8

ing oversize to the tube mill the capacity and efficiency of the mill with air separation would have been found to increase as the rate of feeding increased.

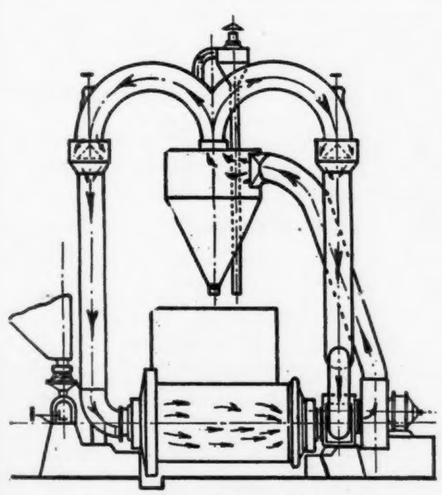
Since the above was written other experiments on air separation have been made by Dr. Martin which are part of a study which goes into the subject far deeper and in a far more scientific manner than any investigations of which the writer has learned. These will be briefly covered in a forthcoming number of this series.

There has also been received some data on the grinding of cement clinker, with and without air separation, which would tend to make one believe that the advantages of air separation in this work are still a subject of investigation. It should be pointed out that there are many other factors than the mere saving of horsepower to be considered. There is the production of a material that shall be of the same fineness from one day to another, for example. At present, too, the tendency toward finer grinding is very marked, and air separation may be more important in finer grinding than with grinding to the present fineness.

In a word, cement must be ground to satisfy other requirements than that the percentage remaining on a 200 screen shall not exceed a certain figure. With certain of the standard types of air separators there is no question but what a greater tonnage is obtained for the same power, where the screen test is the only criterion.



Grinding curves showing the straight line obtained with air separation

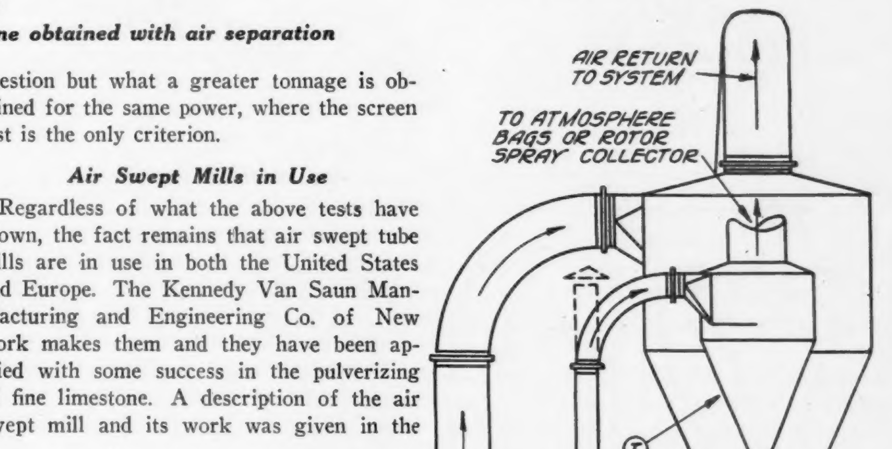


Air swept tube mill in use

Air Swept Mills in Use

Regardless of what the above tests have shown, the fact remains that air swept tube mills are in use in both the United States and Europe. The Kennedy Van Saun Manufacturing and Engineering Co. of New York makes them and they have been applied with some success in the pulverizing of fine limestone. A description of the air swept mill and its work was given in the October 6, 1923, issue of Rock Products. The material ground was limestone and the efficiency of the mill was said to be high, only 12 hp. per ton being used to make a regular product 99.2% of which passed a 100-mesh screen and 84.5% passed a 200-mesh screen. The material, it is to be remembered, was limestone, and this might have had an effect on the separation as well as on the grinding.

The Hardinge Co., of New York experimented a great deal with air swept mills and abandoned them because they found it impossible to get a uniform product from them. The air current passing through the mill would move some of the coarser particles toward the discharge end, even though it was not strong enough to send them out of the mill into the cyclone collector. In the course of time these coarser particles would accumulate and finally, when enough had collected to offer sufficient resistance they would choke the mill even though the conditions near the center and feed end were normal. When this overloaded condition at



Separator applied to conical mill. The parts lettered are referred to in the text

the discharge end occurred the coarse particles would then flow out by gravity into the pipe and eventually drag along the pipe to the cyclone collector where they would contaminate the product. A test made on an air swept mill showed that at low capacities the product was satisfactory, but when the feed was increased to secure the known capacity of the mill, the product became unsatisfactory and the mill extremely sensitive.

The Hardinge Separator

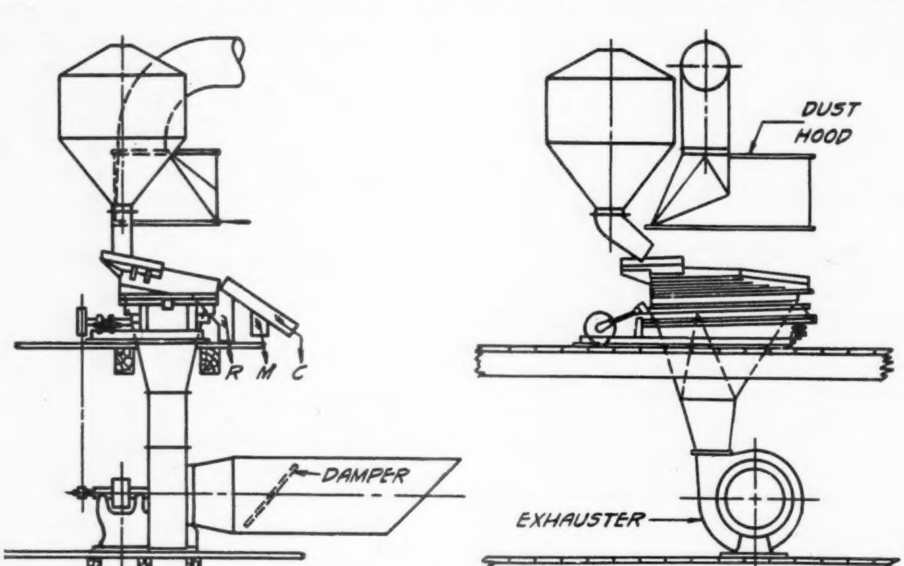
Finding the air swept mill to be so unsatisfactory the Hardinge Co. devised an air separator which would give a uniform product after much experimenting. This separator was mentioned but not described in an article by H. J. Brown in ROCK PRODUCTS for Apr. 3, 1926, "Ball Mill Grinding of Raw Gypsum," to which the reader is referred for data as to the efficiency of a mill working with air separation.

The diagram of the mill and separator shown here illustrates how this separator works. The air enters through a nozzle into the mill, turns and comes back outside of the nozzle. It goes into a double cone chamber rotating with the mill marked B in the illustration shown where it drops the heaviest particles it has brought out. The air pipe leading to the nozzle is cut through at this point and hence the air current picks up these heavier particles in the same way that drops of liquid are picked up by an atomizer. Hence, they are blown back through the nozzle and into the mill at any point desired by regulation of the damper C.

This part of the machine gives a rough separation, but the air leaving the rotating chamber B still contains coarse particles to be returned to the mill. These are removed in a separator having deflector vanes to give a centrifugal action (H) and a lifting pipe (K) through which the final product is carried to the usual cyclone collector.

Adjustment may be made by varying the speed of the fan but a simple and quick adjustment is provided by a damper in the pipe between the fan and the nozzle. There is an adjustment in the separator with deflector blades by which this separator may be set at varying distances from the lifting pipe, thus regulating the size of the product according to principles already explained.

This separator has three features worth noting. One is that the entire system is under partial vacuum except the short straight return from fan to nozzle. A second is that no solid material passes through the fan. The third is the use of the same air current to sweep out the mill and convey the coarse oversize back into the mill.



An air concentrator using principles much like those of air separation

The following operating data have been furnished for mill and classifier by the makers:

1. Silica, ⅜-in., ground so 99% passes 200-mesh and 95% passes 325-mesh, in 8-ft. x 36-in. Hardinge conical mill with pebbles and 6-ft. classifier. Capacity 2600 lb. per hour. Total power required, 64 hp.

2. Bituminous coal, 1-in., ground so 70% passes 200-mesh; 7-ft. x 36-in. Hardinge ball mill and 6-ft. classifier. Capacity 8½ tons per hour. Total power required, 162 hp.

3. Hard clay crushed to 2½-in., ground so that 90% passes 80-mesh in 6-ft. x 22-in. Hardinge ball mill and 4-ft. classifier. Capacity 3.7 tons per hour. Total power 71 hp.

4. Cement clinker crushed to ½-in., ground so that 84% passes 200-mesh in 10-ft. x 66-in. Hardinge ball mill and 12-ft. classifier. Capacity 80 bbl. per hour; total power required 465 hp.

Other Forms of Air Separators

Other forms of air separators than those mentioned here have not been much if any used in the rock products industries. The *air concentrators* will do the work of air separators since concentrators and separators use the same principles, although the design may be different as the machines are used for different purposes.

An air concentrator that is used in the preparation of coal and that has possibilities for cleaning rock products, is made by the Roberts and Schaefer Co., Chicago. The main feature is a shaking table with a deck made of some material through which air can penetrate. The table is provided with longitudinal riffles. By the shaking motion of the table the material (coal with such impurities as slate and pyrite) is urged forward. The air rising through the deck of the table "floats" the coal so that it can flow accross the tops of the riffles as it is urged to do by the slope of the table. The heavier impurities stay down in the riffles and are worked off at the end.

As in all machines of this type, there is a small amount of "middlings" produced where the discharges of coal and impurities meet. This middlings product is returned to the table for re-treatment so that there is no accumulation of partially treated material.

Such machines could be used with a nummer of rock products. One use which suggests itself is the cleaning of silica sand from magnetite, ilmanite, rutile and other minerals which occur in small quantities and greatly depreciate the value for glass making. Phosphate rock is another mineral that has been improved in grade by air concentration, at least in an experimental way.

Moroccan Phosphate Exports

ACCORDING to the Office Cherifien des Phosphates, 1926 exports aggregated 884,918 metric tons, as compared with previous annual totals, as follows:

Year	Quantity metric tons
1920	....
1921	8,232
1922	79,815
1923	190,723
1924	436,953
1925	720,688
1926	884,918

From a review of the statistics of exportation it would appear that the Office of Cherifien des Phosphates has either not attempted or been unable to place its products extensively in other markets than those of Europe. The only exceptions are small amounts sent to the Union of South Africa and to Australia.

The present loading facilities for phosphates at the port of Casablanca allow the charging of vessels at the rate of 300 metric tons per hour for each of the two elevators. The new phosphate loading installation on the transverse jetty occupies an area of 60 meters by 150 meters, is provided with three sets of apparatus for loading and permits (or will permit) charging at the rate of 1000 metric tons per hour. In addition there are storage facilities for 75,000 metric tons. —*Consul H. Earle Russell, Casablanca,* in U. S. Commerce Reports.

Rotary Kiln Gypsum Calcination

THE conviction is growing that calcining of gypsum in rotary kilns has considerable economic advantages—chiefly a lower cost of production. In recent years this has been proved by the remodeling of several plants in central Germany to rotary kiln operations.

The difficulty, which prevents a more rapid introduction of rotary gypsum kilns, lies in the shortage of capital, which today affects the entire industry in Germany. However, the farsighted gypsum manufacturer will find ways and means to solve even this problem, for this is a matter of "to be or not to be," as the manufacturers using kilns can underseil others, who are still struggling with antiquated methods.

It is the purpose of this article to acquaint those who may be interested with the rotary kiln method of calcining gypsum and to illustrate its economic advantages with some cost production data. The heat consumption required for dehydration is from 30% to 50% less than that of calcining kettles. The crushing costs of the rock gypsum are reduced, the rotary kiln utilizing stone of ¾ to 1-in. size in contrast to the fine ground product necessary for the kettle. Further, the kettle operation requires periodic charging and drawing or an interrupted process which results in a certain amount of underburned and overburned gypsum whereas the rotary kiln operates continuously and requires less skilled labor. One or two men, whose attention is mostly fixed on the firing and temperature of the kiln, can do all of the work.

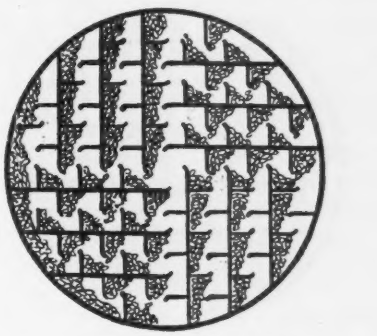
The illustration below shows a modern rotary kiln gypsum plant with calcining and grinding equipment, designed by the Grevenbroich Machine Co., Grevenbroich, Niederrhein.

The gypsum rock hauled from the quarry is crushed in a jaw crusher and broken up to hazel or walnut size in a hammer mill. This material is discharged into bunkers (4) from which it is drawn continuously by a rotary feeder. The material is fed into the kiln (5) by means of elevator (2) and screw conveyor (3) and here comes in contact with the hot gases generated in the furnace (1). The furnace is provided with special arrangement for the removal of volatile ash, thus eliminating possible impurities or discoloration in the gypsum.

The kiln or calcining "drum" revolves at a rate of 3 r.p.m., so that the gypsum becomes distributed over the entire cross section and over the "trickle cell" arrangement. The "trickle cells" shown in the cut consist of metal blades, running the length of the kiln and substantially connected to the kiln walls, provided with projections which are arranged to turn and deflect the gypsum rock, as the kiln revolves. Due to the draft provided by the exhaust fan (8) the charge passes slowly towards the discharge and together with the hot gases. The hot gases give up their heat to the gypsum rock, this being made more effective by the uniform distribution of the charge over the entire cross section, with a consequent high thermal efficiency of the kiln.

The kilns are built with relatively large diameter and the height of drop of the rock from blade to blade is slight. The air velocities being small, very little dust forms during calcination.

During the passage through the kiln the gypsum rock is disintegrated by the heat. The smaller particles are more readily carried away by the draft and reach the end of the kiln, while the heavier particles, those of walnut size, remain exposed to the high temperatures of the gases for a long time. The discharge end of the kiln is equipped with a device which allows only fixed quantities of gypsum to be drawn; the temperature at this end being constant. All of this results in eliminating to a great degree the possibility of underburned or overburned gypsum, providing the length of calcination is regulated. The entire installation operates automatically and needs attention only in the matter of uniform feeding of the gypsum rock into the kiln and of watching the discharge temperature, which is indicated by a conspicuously located thermometer. The calcined gypsum is delivered by the screw (7) to the elevator (10), which is connected with the separator (12).



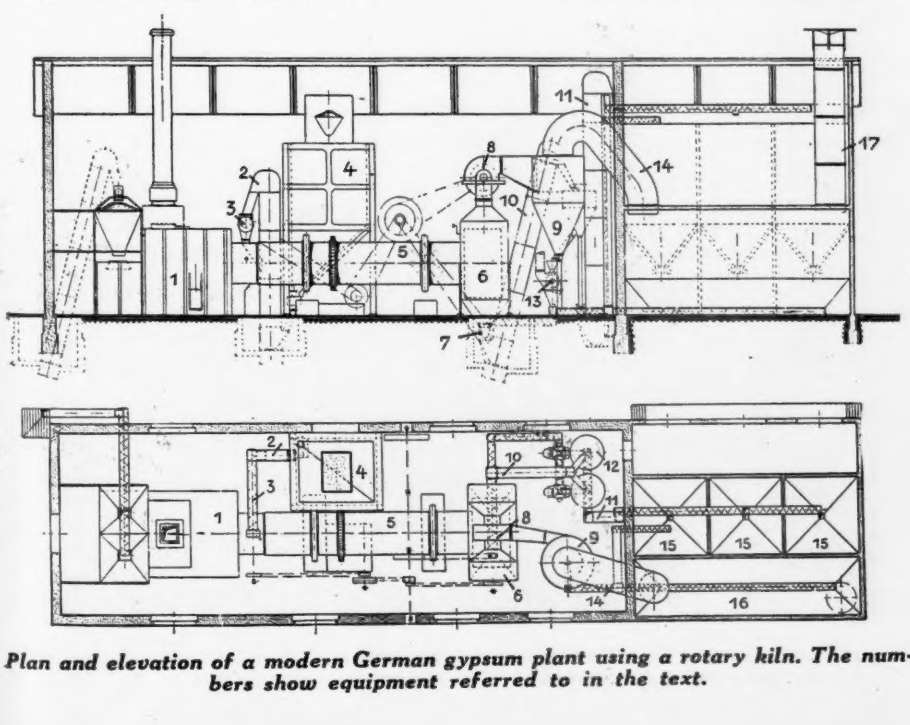
"Trickle cells" in the kiln.

The remaining processes may be designated by the usual term of fine grinding. The coarse material is separated from the fine in the air separator and the fines or commercial product, taken to the storage bin (15). The coarse material is reground in a mill and again delivered to the elevator and the air separator and the cycle repeated.

The exhaust gases of the kiln, containing steam and suspended dust particles, are led to the dust arrester (9) where the dust is collected by expansion combined with centrifugal action. Further purification of the exhaust gases, takes place in the dust chamber (16).

The heat used up in a gypsum plant of 80 t. (80 long tons) daily capacity amounts to 4,300,000 W.E. per 10 t. (about 1,720,000 B.t.u. per long ton) of burned gypsum, i.e., 1870 kg. (4114 lb.) brown coal of 2300 W. E. (4100 B.t.u.). The power consumption is about 20 kw. A further 20 kw. is consumed by the mills with conveyors, so that the total cost of operation, including calcination and grinding, can be figured as:

1870 kg. lignite @ 8 M. per ton, price including freight and unloading	M14.96	$3.58
$\frac{24\times40}{8}$ = 120 Kw-hr. @ 0.08 M.	9.60	2.28
Wages, lighting, oiling, repairs, etc.	4.04	0.96
Total per 10 t. burned gypsum	M28.60	$6.82



Plan and elevation of a modern German gypsum plant using a rotary kiln. The numbers show equipment referred to in the text.

*Tonindustrie-Zeitung, (1927), 46, 815-16.

Mechanical Quarrying of Cement Material

New Plant of the Warrior Cement Corp., Demopolis, Ala., Has Unique Methods

WHEN the Warrior Cement Corporation took over the holdings of the Gulf States Portland Cement Co. it had to choose between suspending operations and building new from the ground up, and keeping the existing plant in operation while the new plant was being built. The latter course was chosen and the new plant was built practically on top of the old one, since conditions hardly permitted another site. The choice was a wise one, for, while the old plant was admittedly obsolete and too small to be profitable, it was steadily turning out 800 bbl. a day and it had the firm good will of dealers and others to which it regularly sold. This good will was too valuable an asset to be abandoned.

The old plant not only continued its operation, but, as new equipment was added, the output continually increased. The new company took over the plant August 1, 1925. By December 1 the daily output had increased from 800 bbl. to 1500 bbl. There was a steady increase thereafter until the second of the new (and larger) kilns was put in production, when the capacity reached 3000 bbl. per day, which is the present output. This was accomplished February 1, 1927. But the plant is not yet complete; construction is still going on, and some time in 1928 a third large kiln will be producing and the output will be 4500 bbl.

Cement has been made from this quarry for almost thirty years. The quarry was opened in 1898 by an Englisn company, the Alabama Portland Cement Co., Ltd., of London. It remained in business for nine years, producing about 200 bbl. per day. Some of the old kilns of this company, which were only 60 ft. long, were afterwards used for dryers. They were torn out, when the ground was needed for later improvements, quite recently. Grinding was done in ball mills followed by tube mills, and these stayed in service until the Warrior corporation installed modern compebs as the first step toward raising the plant's output. In fact, little is left to remind one of the original plant except the name of the plant railroad station and postoffice, two miles from Demopolis. It is Spocari and it was taken from the names of the men who built and operated the original plant, Spokeman, Carns and Richardson.

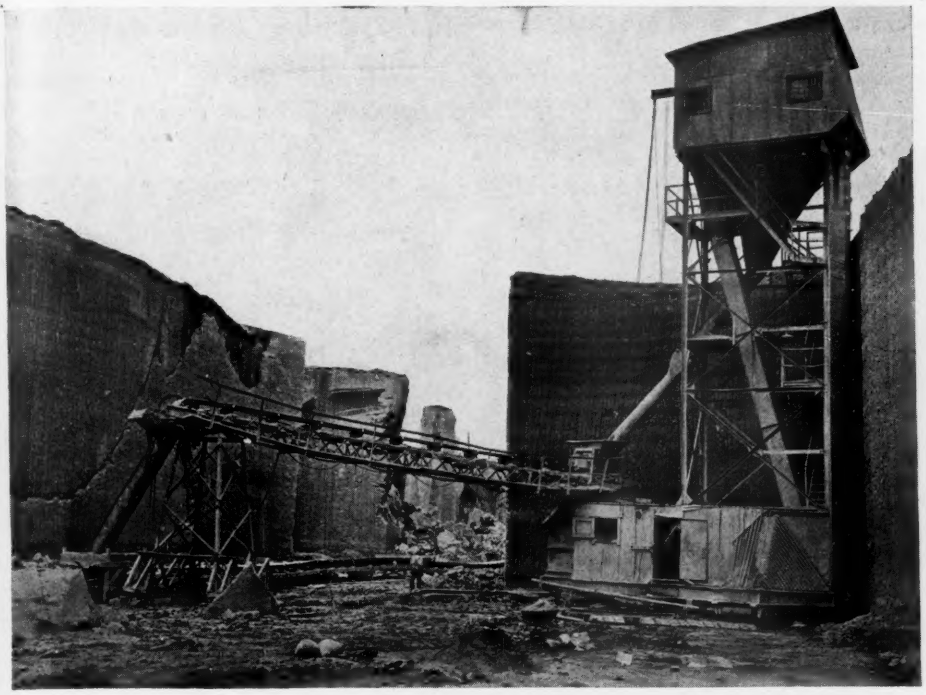
Chalk Is Raw Material

Perhaps they were attracted to this place because the quarry is in chalk, and chalk is the commonest cement material in England, as it is in France and Belgium. Geologically, it is the Selma chalk, a marine deposit of the Cretaceous period, and the geological map of Alabama shows a belt of considerable width extending across the state. Not all of it is good for making cement, however. The map gives its thickness as 1000 ft., but only about 80 ft. of this is good for cement making, as prospect drills have determined at Spocari.

Chalk is used for making cement by several Texas plants, but the Texas chalk is as hard as some limestones. The Selma chalk is like a firm, hard clay in texture. Naturally a plant which uses such a material has some unique features, the principal

Everything shown here is new and makes a complete cement plant, which was built as the old plant was torn down, without decreasing production

one being the quarry. The chalk is dug with a clay digging machine and transported directly from the machine to the raw storage house by a system of belt conveyors. It looks strange to see a cement quarry running without well-drills, shovels, cars or



The clay digging machine which digs the chalk that is almost a complete cement material

locomotives, and most of the time without a man in sight, since the attendant sits up in the machine, yet with a steady stream of rock flowing into the plant at the rate of about 125 tons per hour. This gives the company the advantage of producing from what is probably the cheapest cement raw material in the United States.

The chalk is almost a complete cement rock, resembling in that respect the cement rock of the Lehigh valley. But the Selma chalk is a little higher in lime. A typical analysis is:

SiO_2	11.10%
Al_2O_3	4.90%
Fe_2O_3	2.42%
$CaCO_3$	79.49%
MgO and undetermined	2.09%
	100.00%

The lime content varies slightly. At times it is necessary to correct it by adding sand, but sand has never been added in excess of 3%. The sand analysis is:

SiO_2	93.80%
Al_2O_3	2.30%
Fe_2O_3	2.40%
$CaCO_3$	1.10%
MgO and undetermined	0.40%
	100.00%

When it is necessary to add sand the addition is made by what appears to be a very crude method, that of having a man put so many shovelfuls per minute on the belt that carries the rock to storage. The records of the mix, however, show that the method is efficient, as the lime content varies only a fraction of 1% from day to day. However, to avoid the ununiformity that might come from neglect, and to carry out the policy of substituting machine work for hand work

The long conveyor that takes the material from the digging machine to the plant

wherever it is better, a poidometer will be installed to add the sand required.

Quarry Practice

The chalk is covered with 18 in. to 2 ft. of top soil and the quarry is stripped by plowing this dirt and then picking it up with a steam shovel and hauling it away in Ford trucks. In some places there are erosion channels and the picture of the shovel shows it working in one of these. The steam shovel was made by Orton Crane and Shovel Co. and has a ¾-yd. dipper. The company has a contract for a fill on the line of the Frisco railroad which is being constructed near the plant and will dispose of strippings for three years' quarry operations by putting them in this fill.

The clay digger which quarries the chalk was made by the Stephens-Adamson Manufacturing Co. An older machine made by the same company was operated by the Gulf States company and is still operated occasionally, when the regular digger is being repaired.

The digger is a very ingenious machine. It cuts steadily through the arc of a circle, advancing at each cut, without stopping to move up. The cutting feature is a chain elevator with a very heavy chain and heavy buckets. Projecting from the front of each bucket is a broad tooth which drags through the chalk, cutting it so that it falls into the bucket below. The top bucket passes over a sprocket and back horizontally and dumps into a chute and a conveyor which takes it to the field conveyor and so to the plant. The end of the conveyor on the machine is pivoted above the cutter on which the machine revolves so that it does not have to move as the machine swings through its arc. The other end is fastened to a carriage which advances with the machine.

The buckets can cut through 50 ft. vertically, but the face is carried about 45 ft. high. Drainage has to be provided for, hence the machine cuts up hill on the advancing cut and down hill on the return cut, leaving a bottom with a slight slope.

The frame of the machine is suspended at three points. One is the center about which

it moves, the other two are rollers which rest on a circular track. The machine while running is set out from the center by these rollers sliding on the track, advancing from ½ in. to ¾ in. at each cut. At the end of

Bottom of digging chain. Note teeth on buckets

this movement the track must be shifted, and this is done by the machine in its motion. A push pole of pipe hung on the side of the machine bears against the track and pushes it ahead as the machine turns. Finally the center of the machine must be set forward. This center is on a truck which rests on sections of track on which the wheels are held from turning by being blocked. When the time comes to shift, the machine drags one of the track sections around, the blocks are taken away from the wheels of the truck and the machine pushes itself onto the new track section. Every move is made by the machine itself, and there is practically no loss of time from its start in the morning to its shutdown at night.

A 150-hp. motor drives the cutting chain and two 15-hp. motors drive the traveling mechanism.

The action of the old machine is the same as that of the new, but the new machine is all of steel and more substantially constructed in some of its parts.

Transportation

From the two machines (the old and the new) field conveyor belts, 24 in. wide, run to the main quarry conveyor, which is 900 ft. long and 30 in. wide. At the end of this is the crushing plant, unique also in cement practice, since it consists of only a single pair of rolls. These are of Jeffrey make, with toothed shells, similar to those used in coal crushing. One roll runs a little faster than the other, which prevents clogging. Hammer mills and other crushing devices tried were not satisfactory with this material and B. R. Alford, the chief engineer of the company, installed these differential rolls as a pure experiment. But their work has been very satisfactory indeed. They reduce the chalk to the right size to feed to the dryers and the raw grind mills.

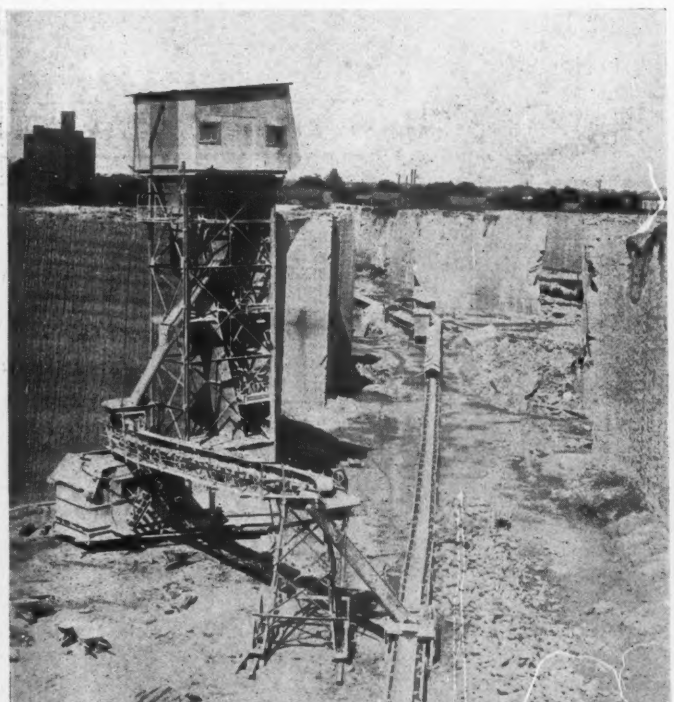
From the rolls the material goes to another conveyor, 1050 ft. long, which takes it to the stone storage house. Here, as this long conveyor discharges on the storage conveyor, the sand is added as mentioned.

These conveyors are all of Jeffrey make. The other conveying and elevating equipment in the plant, including belts, chain elevators and screw conveyors, was furnished partly by the same company, partly by Link-Belt and partly by the Weller Manufacturing Co. and the Webster Manufacturing Co.

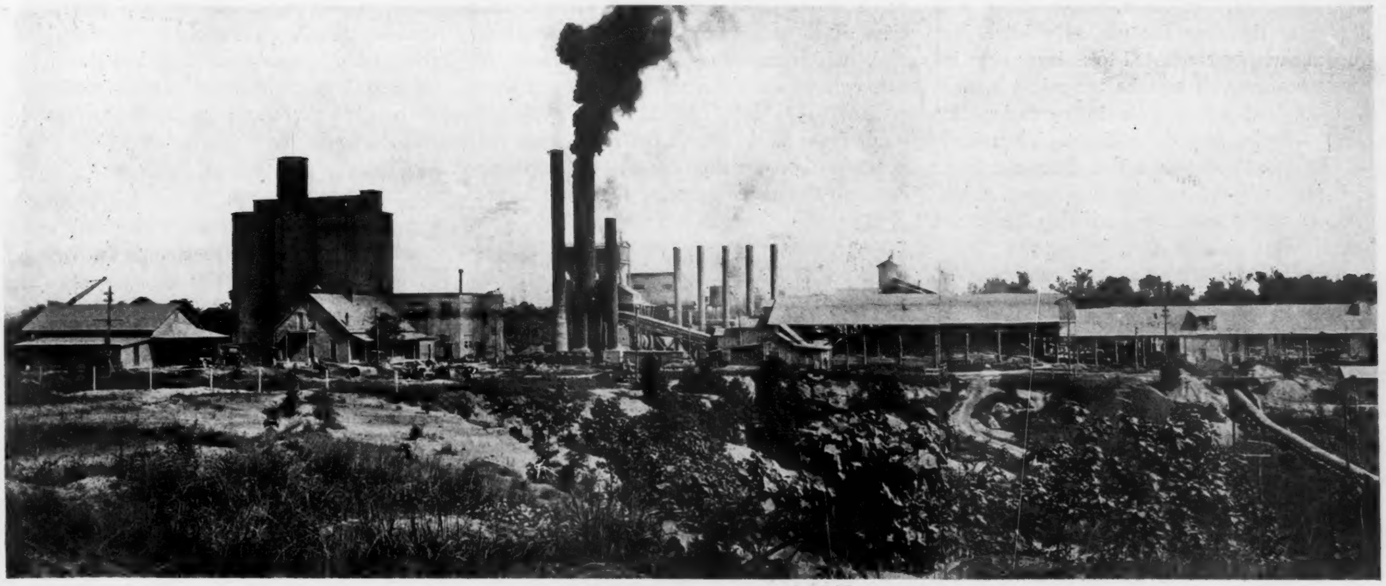
A 20-hp. motor drives the 1050-ft. belt and a 15-hp. motor drives the 900-ft. belt.

The sliding roller on the track

A 30-hp. motor drives the crushing rolls. A 10-hp. motor and a 15-hp. motor drive the two short belts that come in from the clay diggers. These, and all the other motors in the plant, are of Allis-Chalmers make. The drives on the belts described are all through belts or through belts and gearing, but the conveyors and elevators in the plant are driven through Foote Bros. speed reducers. All the speed reducers in the plant are of this make.



These show the new machine with part of the belt system and the old machine now held as a reserve



Panorama of plant. The old quarry, worked in 1898, shows at the lower left

The storage belt, driven by a 20-hp. motor, has an inclined section, which raises it about 30 ft. from the ground, which is 87 ft. long. Then the belt runs horizontally for 140 ft. and a tripper turns the load into the storage pile below. Recovery is by a 24-in. belt. 140 ft. long in a tunnel underneath the storage pile with simple gates and inclined chutes in the roof. Four thousand seven hundred tons of recoverable material may be carried in storage.

The storage pile is under a shed which is one of the relics of the old operation. It is planned to put up a new shed of steel frame construction as part of the present year's building program.

Drying the Chalk

The chalk as quarried contains from 14% to 18% of moisture, according to the weather. Even when the surface is perfectly dry it contains 14%. This moisture content is reduced to 1½% in the dryer, for it has been found that the chalk grinds better and burns better in the kilns if a little moisture is retained.

Sand is added by shoveling at the point where the field conveyor discharges on the storage conveyor

The material goes to the dryer from the storage recovery belt by a chain elevator of 34-ft. centers, with 8x16-in. buckets, driven by a 15-hp. motor through a speed reducer. This discharges into a 10-ton hopper at the bottom of which is a Schaffer poidometer which feeds on a 24-in. conveyor belt 65 ft. long. This is driven by a 10-hp. motor through a speed reducer and it delivers into the dryer.

The dryer is one of the 9x125-ft. kilns, made by the Vulcan Iron Works, which was used by the old company. It was converted to a dryer by changing the pitch from ½ in. per foot to ¾ in. per foot and taking out the lining for half its length. In this half lifters made of 12-in. I-beams were placed to turn the material and advance it as the kiln rotates. There were two of these kilns in the plant when it was taken over and only one

The push pole by which the machine is slid over on the track by its own power

Stripping the chalk. The shovel was working in a depression when the picture was taken

was converted to a dryer, as the other was needed at the time for use as a kiln. But this kiln will be converted to a dryer shortly. First, however, it will be moved to a new position, and when it is in operation the other will be moved beside it. Then both will be connected with a flue from the kilns and fans will be put in to draw the hot gases from the kilns, thus utilizing the waste heat from the kilns for drying the chalk. The accompanying plan shows how this work will be carried out.

The present dryer puts through 60 tons of wet rock, producing approximately 50 tons of dry rock per hour. This is admittedly overcrowding the dryer, and when the rock is wet the firing has to be forced to where the black smoke issues from the stack. The day before the plant was visited there was a rain and consequently the pictures which were taken show this black smoke. This loss of efficiency is put up with because it is recognized as a temporary condition.

Why the Dry Process Was Chosen

Since the rock contains so much moisture, the natural question to ask is: Why was the dry process chosen? The decision to employ it was not made without a careful study of the conditions, and three good reasons were found for using the dry method. The first of these was the nature of the material, which requires 52% of moisture to bring it to the consistency that is attained with 33% to 34% moisture in the slurries made from hard limestones. The second reason was that the site did not permit the installation of the long kilns that would have been needed, especially with a slurry that contained so high a moisture content. And the third was that experience had shown that an excellent cement, uniform as well as of high strength, could be made by the dry method.

Toothed shells for rolls

Probably the limitations of the site was the most powerful argument for holding to the dry process. To have changed would have meant a complete change of location, abandoning all the advantages derived from the relation of the plant site to the quarry and the facilities for shipping by both rail and water.

It will be noted that the excess moisture content required to make slurry of this chalk and the moisture in the chalk as quarried are about the same. In other words, there was about 16% of moisture to be dried out, whether the wet process or the dry process was chosen, to put the plant on an equality in moisture contents with plants using other materials.

Raw Grinding

The dried material is brought back almost to the head of the dryer by a 12-in. drag chain 120 ft. long, driven by a 40-hp. motor. This delivers to a hot elevator of 50-ft. centers and 8x18-in. buckets, which is driven by a 20-hp. motor through a speed reducer.

Plan of the works of the Warrior Cement Corp. showing

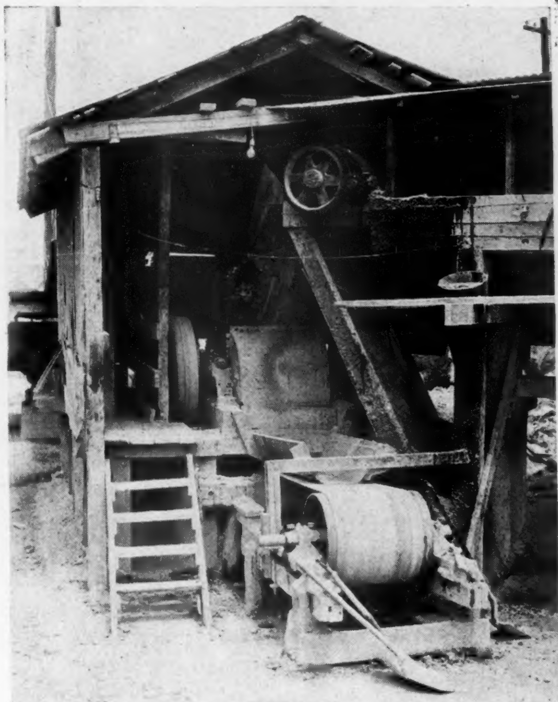
From this it goes to another 12-in. drag chain, 50 ft. long, which delivers it to the raw grind mill bin. This bin holds about 300 tons and is arranged so that correction of the mix can be made at this point.

The raw grind mill is a 7x26 Allis-Chalmers compeb driven by a 500-hp. synchronous motor of the same make through a Cutler-Hammer magnetic clutch. There is no flexible coupling on the clutch shaft. Grinding does not have to be carried to the extent that it does with some other materials. The chalk is ground to 80% through 100-mesh and 68% through 200-mesh, so the mill has a large capacity. It can put through enough to make 150 bbl. of cement per hour. The mill discharge goes to a 16-in. screw 40 ft. long, which is driven by a 10-hp. motor through a speed reducer, which delivers to a 10-in. Fuller-Kinyon pump. This pumps to the kiln feed tanks, and the pipe carrying the material has a run of 125 ft. and a rise of 85 ft. A 50-hp. motor drives this pump, which appears of low horsepower for the distance and the height to which the material is raised, but this is because the ground chalk is bulky, weighing less per cubic foot than ordinary limestone.

Very little dust is produced in grinding. Most of the cloud that shows above the mill house is steam from the small amount of moisture left in the chalk after drying.

Plans for Correction Silos

It will be noted that the only corrections made are to the raw material before it is ground. So far this has been sufficient, as the quarried material is so uniform. But this fortunate condition may not always continue, and furthermore there is the desirability of having everything under control up to the moment that the material is sent to the kilns. For this reason the silos shown in the accompanying plan, in the space beyond the grinding mills, are to be erected shortly to serve as correction tanks. There are six of them, each 25 ft. in diameter and 50 ft. high. All of them are to deliver into a 16-in. screw conveyor at the bottom, and this screw is to deliver to a 10-in. Fuller-Kinyon pump. The pump will draw from two or three tanks as required and pump into another tank from which the feed to the kilns will be taken.



The only primary crusher; rolls placed at the junction of the field belts

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From the kiln feed hoppers the kilns are fed by a non-flooding screw feeder devised by Mr. Alford. The screw takes it from the bottom of the hopper to what he calls the "anti-flooding box," a box about 6 ft. high, 4 ft. wide and 2 ft. thick. The screw enters at the bottom and if the material contains air in such a way that it would flood, it rises in this box, allowing the excess air to escape. Another screw conveying in the opposite direction takes the material to the kiln.

There are two kilns 150 ft. long and 10 ft. in diameter, made by Allis-Chalmers. Each is driven by a 50-hp. motor through a spur gear speed reducer, the reduction being from 208 r.p.m. to 20 r.p.m. Gearing still further reduces the rate to the proper kiln speed. The motors are of the variable speed type.

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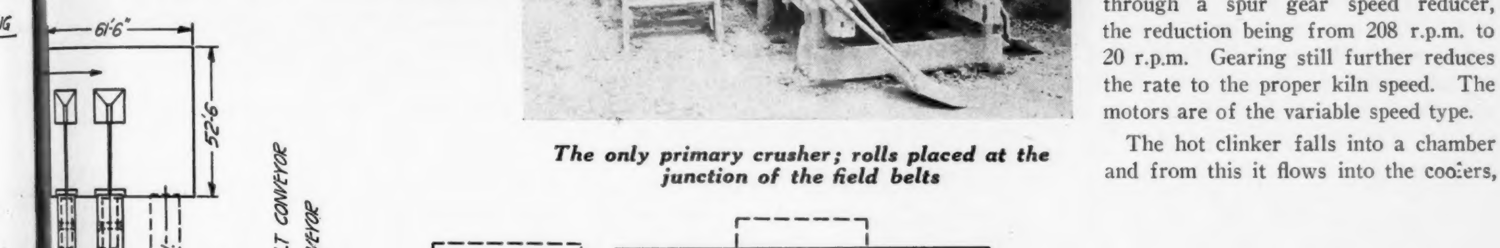

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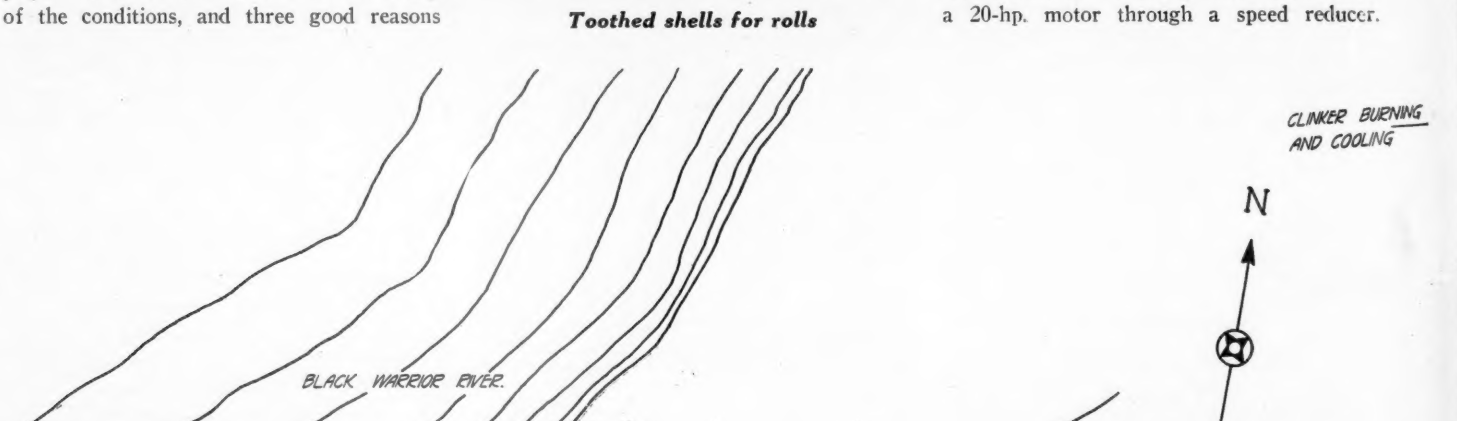

Plan of the works of the Warrior Cement Corp. showing eve

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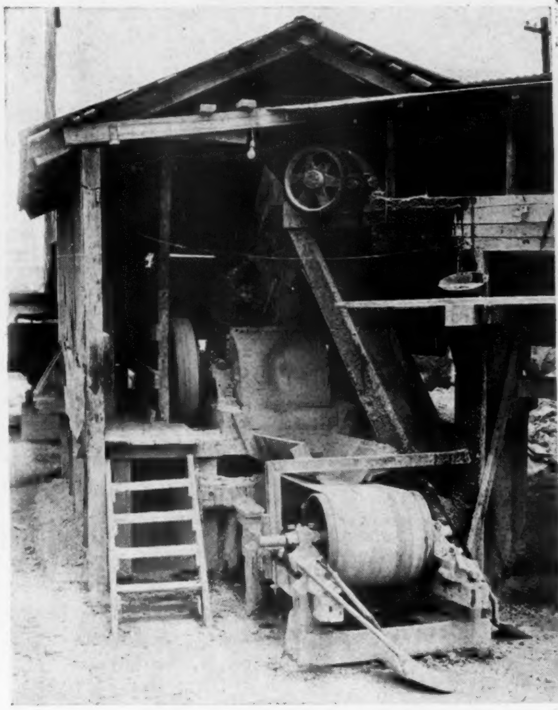

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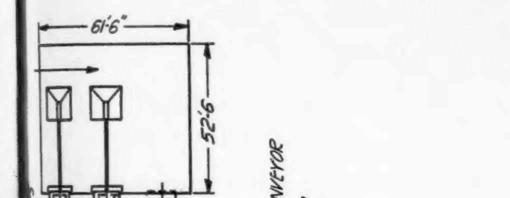
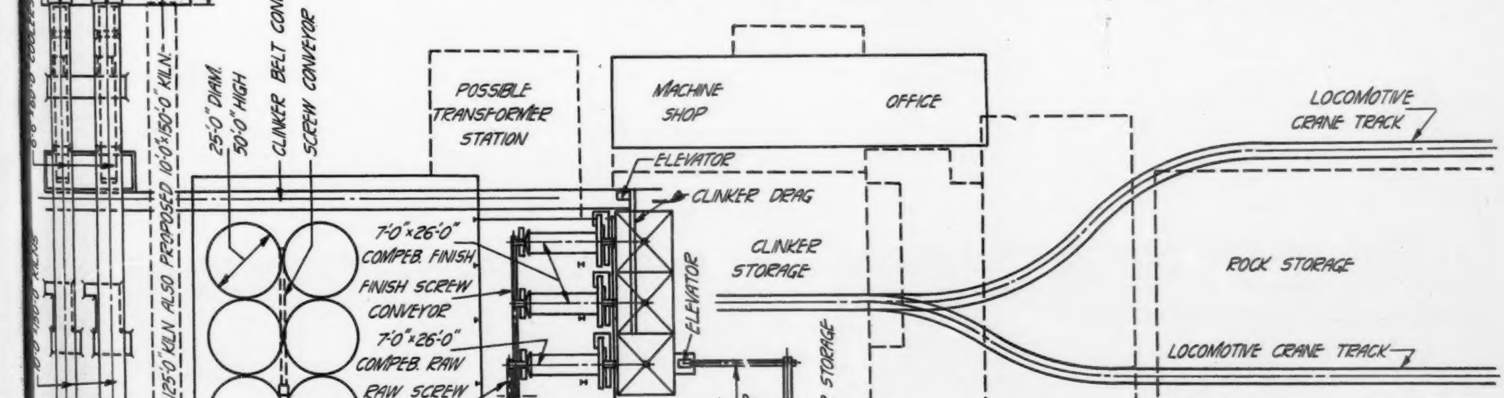




…thing as it will be when all the projected work has been carried out

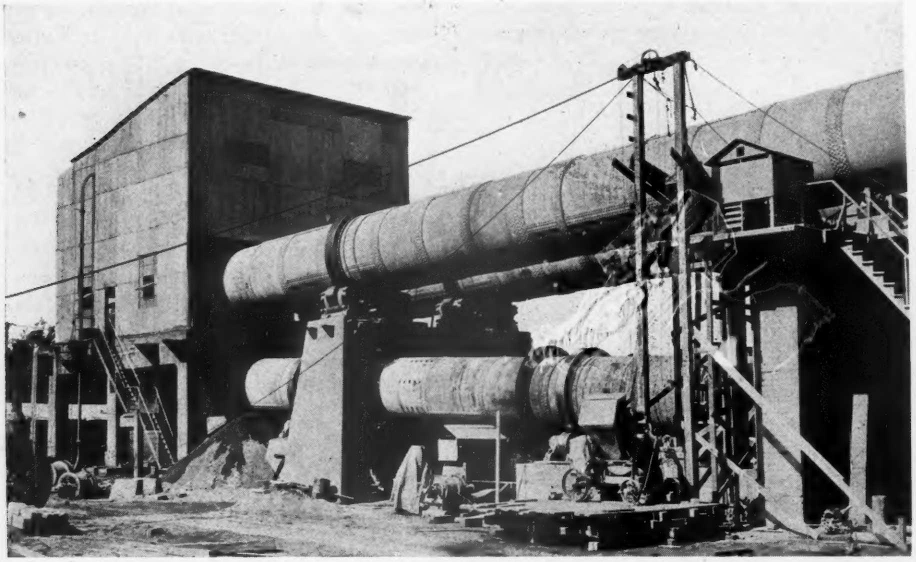
which are 8 ft. in diameter and 80 ft. long. These are driven by 35-hp. motors through a speed reducer of the same type and ratio as those used on the kilns.

All the air that is drawn into the kilns, except what comes in with the powdered coal, is drawn through these coolers and the chamber that connects them with the kilns, thus conserving the heat of cooling as much as possible.

Firing is with powdered coal delivered by an Allis-Chalmers screw feeder to a Sturtevant fan. This is of the exhauster type and may be connected to use heated air if this is desired.

The stacks of the kilns are of steel and of the self-supporting type, 125 ft. high. They were designed by Mr. Alford. When the waste heat of the kilns is used for drying, fans will be installed to pull the gases through the dryers and a concrete stack will be built.

Besides the two new kilns just described, one of the 8x125-ft. kilns used by the old company is used for burning clinker. This has no cylindrical cooler, the hot clinker going to a pit from which it is afterward lifted by a hot elevator and sent to a storage pile. A locomotive crane lifts it from the storage pile to the hoppers of the finish-grind mills.



The new kilns and coolers (taken while other construction work was going on)

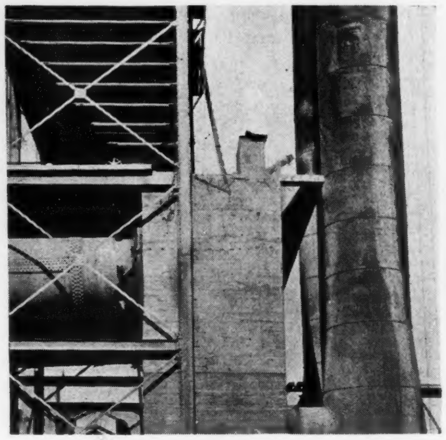
Coal Mill

The company owns its own coal mine, which is on the Warrior river at Cordova, about 150 miles from the plant. Transportation is by water; the barges of the Mississippi-Warrior service bring coal to the plant and take cement that is shipped to Mobile and New Orleans.

The mine was producing about 2500 tons a month when it was taken over, and its production has been gradually increased to the 6000 tons which is its present monthly output. It is machine operated, the coal being cut by a Goodman low-vein machine and drawn out by a Goodman electric locomotive. The vein is 34 in. wide, which necessitates doing some rock work on entries, and for this Ingersoll-Rand jackhamers, operated by a portable compressor, are used. A toothed roll at the mine breaks the coal to 2 in. and finer.

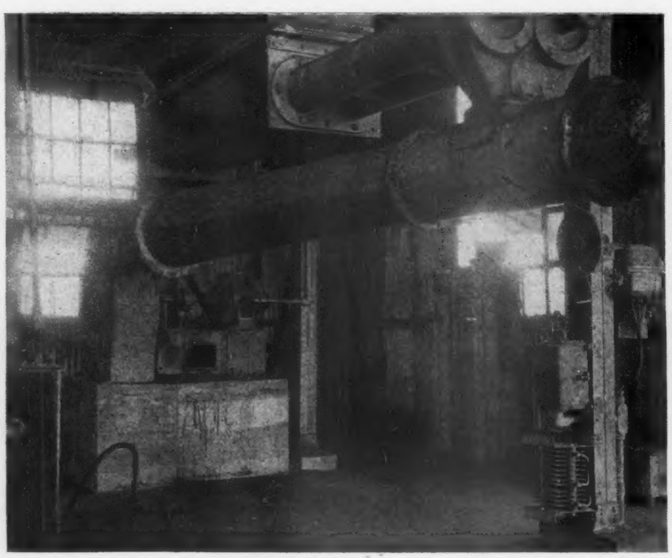
The barges of coal are unloaded at the plant landing by an American derrick, electrically driven. From the bin to which the derrick delivers it the coal is taken by a conveyor about 250 ft. long which delivers it to a bin. From this it is fed by a Schaffer poidometer to a short belt that delivers it to a Ruggles-Cole dryer, 30 ft. long and 60 in. in diameter. There are two of these dryers in the coal mill, but one has been found to have ample capacity for all the fuel required under present conditions. It is driven by a 15-hp. motor through a speed reducer.

After passing the dryer the coal goes to

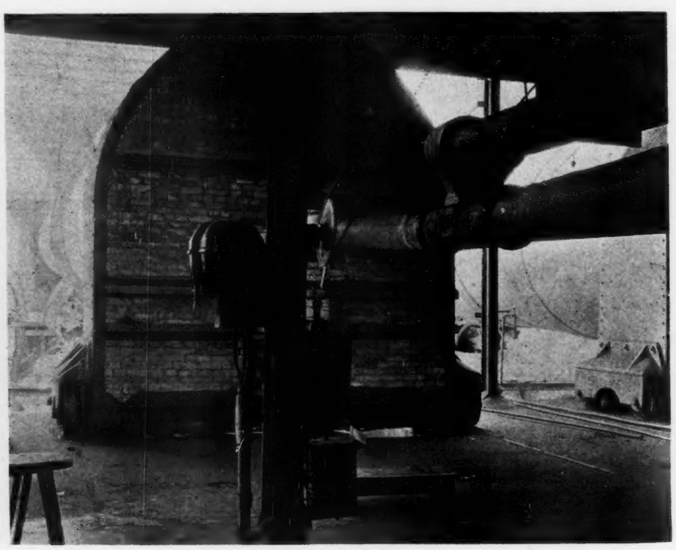


The box that prevents "flooding"

the boot of an elevator of 50-ft. centers, by which it is lifted to the hoppers of two Fuller-Lehigh mills. These are 42 in. in diameter and each is driven by a 100-hp. motor of the vertical type. The discharge of these mills goes to a short screw conveyor that takes the pulverized coal to a 6-in. Fuller-Kinyon pump. A 25-hp. motor drives this and the run is about 300 ft. and the rise 65 ft. This delivers to the hoppers of



Pulverized coal feeder and fan



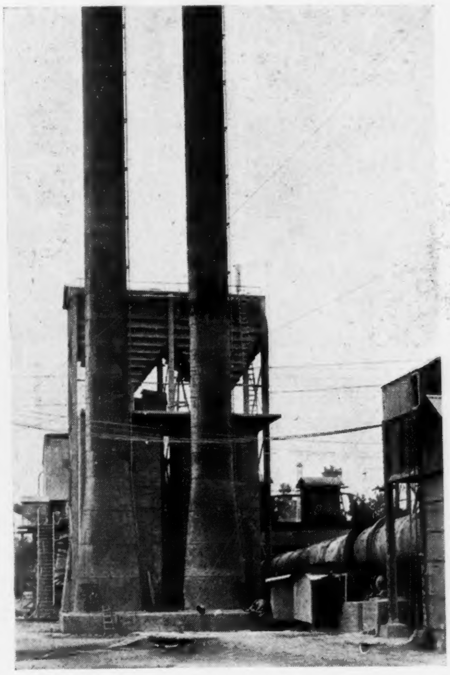
Hood and coal pipes of one kiln

the coal burners placed before the kilns.

Finish Grinding and Packing

Clinker is brought to the finish grind mills from the coolers by a Jeffrey drag conveyor, 180 ft. long, driven by a 20-hp. motor and speed reducer. This delivers to a chain elevator of 46-ft. centers with 8x16-in. buckets, driven by a 10-hp. motor and speed reducer. This discharges to a short drag chain which discharges into the tanks from which the compeb mills are fed.

There are two of these, in the same house



Steel stacks to be replaced later by a concrete stack

that contains the raw grind mill and driven in the same way. In fact, either is a duplicate of the raw grind mill described, and like it they are fed with Schaffer poidometers. They discharge to a 16-in. screw 80 ft. long which takes the cement to a 6-in. Fuller-Kinyon pump which delivers to the silos. The pump line has a run of 350 ft. and a rise of 95 ft., and a 75-hp. motor is the power unit.

There are six silos built by the Bland Engineering Co., each 30 ft. in diameter and 80 ft. high. The space between is made into two bins and the whole has a capacity of 110,000 bbl. This is a somewhat smaller storage than has been provided by some other mills of the same output, but not all the storage is kept at the plant. Storages of 15,000 bbl. are provided at both Mobile and New Orleans, the cities to which most of the plant product goes.

The cement is recovered from the silos by two lines of 16-in. screw conveyors built by the Webster Manufacturing Co. The valves leading into them are of the sliding gate type and an opening is provided for an air pressure hose to break any arches that may form above the gate. These screws deliver to a short cross screw that delivers to a 10-in. Fuller-Kinyon pump. This is set under the Bates packing machines in the pack house and a short screw under these machines delivers spill to the same pump.

The main packhouse, which is about 50 ft. square and two stories high, with the second floor used as a bag house, joints on to the silos.

Shipping Facilities

As the plant is on the bank of the Warrior river, it has the advantage of the Mississippi-Warrior government barge service to ship to New Orleans and Mobile. It can, if desired, ship to other points on the Warrior system, which is said to have 475 miles of navigable waters in Alabama. Its ability to ship by water has been of great advantage in furnishing cement to the concrete bridge that is being built across Lake Ponchetrain to carry an automobile highway into the city of New Orleans, and which is said to be the longest bridge yet built. The cement, brought in by barges, is unloaded at any part of the work where it is needed.

In addition to the river, the company has shipping facilities over the Southern railroad, which passes through the plant. And the new line of the Frisco railroad, which is being built to Pensacola, Fla., passes only a short distance from the plant, and when this is completed a territory will be opened which could not be reached easily before.

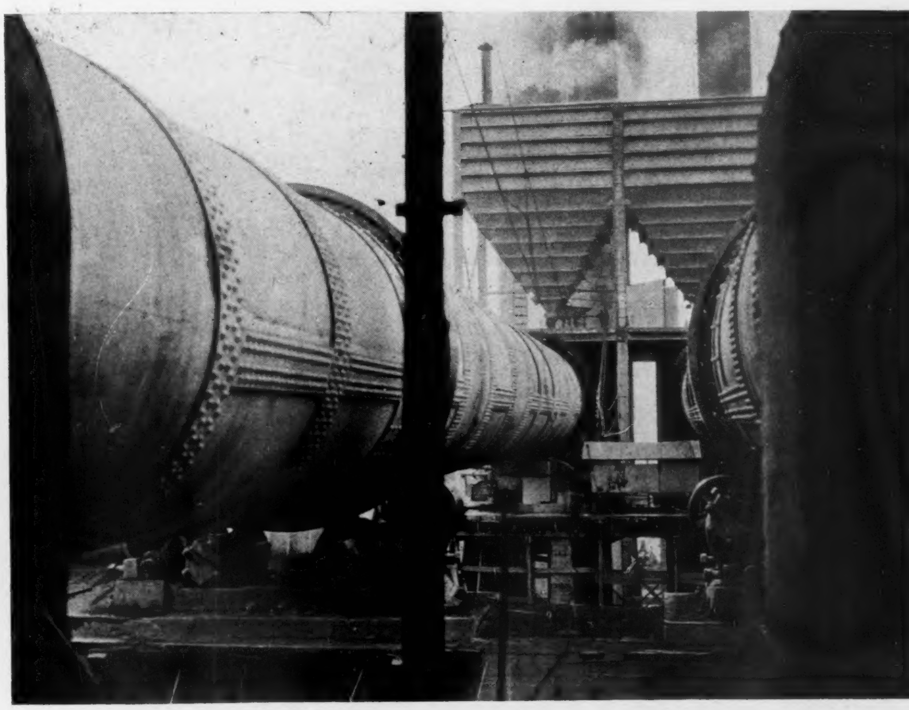
Notes on Design and Construction

All the new buildings in the plant are of steel frame and concrete and the siding is all of "Armco" iron (made by the American Rolling Mills Co.). This was chosen because of its resistance to sulphur gases, for both the coal used and the chalk contain sulphur in the form of pyrite. About the only old building retained is the old power house, which is substantially built of brick. This is used now as a compressor house and a repair shop. It contains two Ingersoll-Rand compressors, one of 800 cu. ft. and one of

The storage silos

1500 cu. ft., each driven by an Allis-Chalmers motor through a Lenix drive. Almost the only use of these compressors is to furnish air for the Fuller-Kinyon pumps.

In studying this operation, one of the first things that impresses one is the unusual employment of conveyors. From the quarry face to the packing machines, conveyors handle the material all the way (if Fuller-Kinyon pumps be classed as conveyors). This use of conveyors is especially noticeable in the quarry, where over 2000 ft. of belts convey the material from the face to the raw storage.

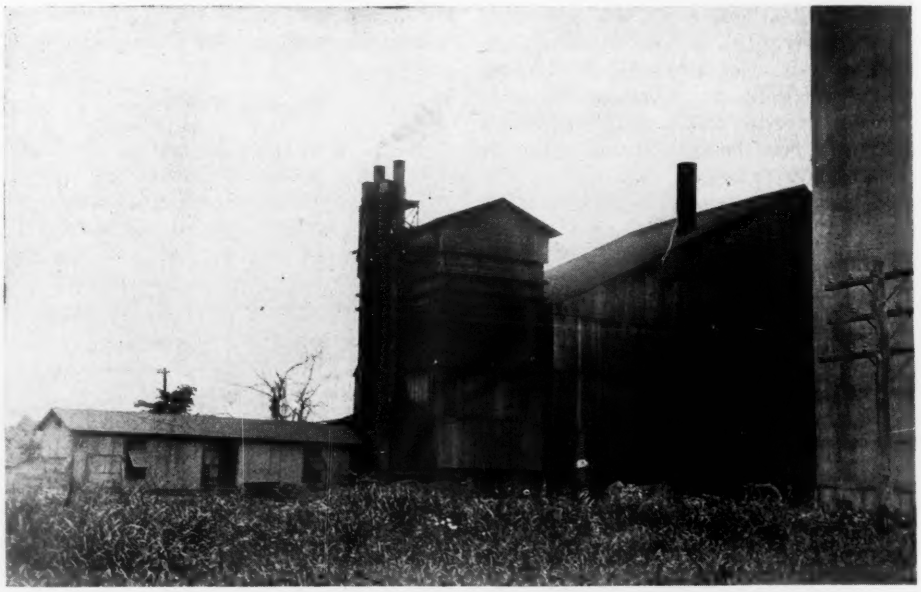


Looking between the kilns to the feed hoppers

Before deciding to retain this conveying system, the designers, who are all old cement makers and thoroughly familiar with the conventional types of quarries, made a careful study of this operation. A limit was found at which the depreciation, repair and maintenance cost and power cost of the conveying system would equal the operating costs of quarry cars and locomotives, or trucks, but it has not yet been reached and will not be for some time.

It was a problem to have the construction work carried on so that the capacity of the plant could be increased while the new plant was being built. This was done by first building those units which would increase capacity. Since the capacity for grinding was the limiting factor, the new grinding mill was built first of all, and to provide facilities for storing and handling an increased production the silos and packhouse were started about the same time. Plans had to be made quickly. The plant was taken over August 1. Actual drawing of plans was begun on August 15, and by October 1 ground was broken.

The coal mill was the first construction, and then the kilns were put in. It is interesting to note that the first new kiln made good clinker 1¼ hr. after it had started.



The coal mill. Coal comes from the dock by an underground conveyor

Barges bring coal from the company's mines and load cement for shipment

Electric power was substituted for steam power wherever possible from the start. Long before the present output was attained everything was electrically driven.

As increased output of the plant meant an increased production from the quarry, the new digging machine was installed in time to be ready for the larger kilns.

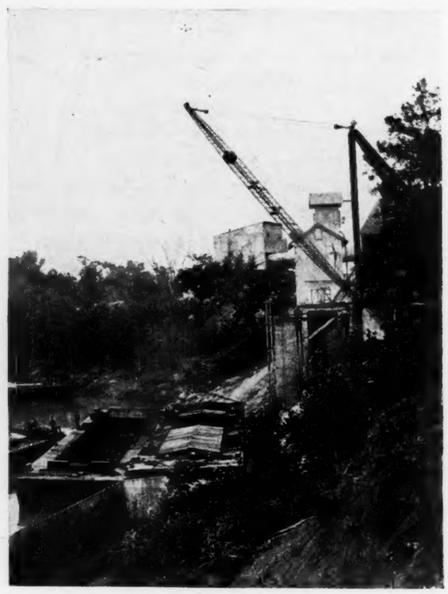
There were two serious delays. One came from the collapse of an old wooden building that left considerable wreckage in the way of construction and the other came from a fire. The wooden shed which covered the old kilns caught fire and the flames spread to the form work which had been placed for the foundation for the new kilns.

The cement made from the Selma chalk at this plant naturally runs slightly higher in lime than some other American portlands because of the nature of the raw material. An average analysis of the present output is:

SiO_2	19.60%
Al_2O_3	8.04%
Fe_2O_3	4.20%
CaO	64.45%
SO_3	1.91%
MgO and undetermined	0.90%
Loss on ignition	0.90%
	100.00%

Lime ratio, 2.02; silica ratio, 1.52. The cement has an early high tensile strength, running from 200 to 213 lb. in 24 hr., and 300 to 335 lb. in 3 days. When the contract for the Lake Ponchetrain bridge job was obtained the cement had to meet a 50-lb. increase over A.S.T.M. specifications.

Most of the men in charge of the affairs of the Warrior Cement Corporation were with the Signal Mountain Portland Cement Co. when the plant of the latter was designed and built. These include A. C. Deer, now president of the Warrior Cement Corporation; C. S. Stewart, chairman of the board and treasurer; W. F. Boley, secretary; B. R. Alford, chief engineer and plant superintendent; P. S. Stewart, sales manager, and A. L. Kilgore, chemist. L. E. Brading is purchasing agent, E. G. Spencer is assistant superintendent and chief electrician, and C. E. Harper is quarry foreman. The design and layout of the plant were made by A. C. Deer and B. R. Alford. The main office is in Chattanooga, Tenn.



At the landing

Use of the Wire Saw in Slate Quarrying

Cost and Operation Data Based on Recent Tests at a Pennsylvania Slate Quarry

By Oliver Bowles

Superintendent, Nonmetallic Minerals Experiment Station, Bureau of Mines, New Brunswick, N. J.

THE use of a wire cable to cut rock appeals to one as rather unusual, for while quarrymen are accustomed to the use of cables for holding derricks and other equipment in place its use as a tool is novel in American practice. The wire saw, which is simply a three-strand wire rope running as an endless belt, is used with success in slate and marble quarries in Italy, France and Belgium, but similar use in America in so far as the author is aware is confined to its temporary use in a marble quarry in Colorado some years ago, and to more recent use in a marble quarry at West Rutland, Vt. It is used at several stone finishing plants for trimming mill blocks, but such a process cannot be classed as a quarry operation.

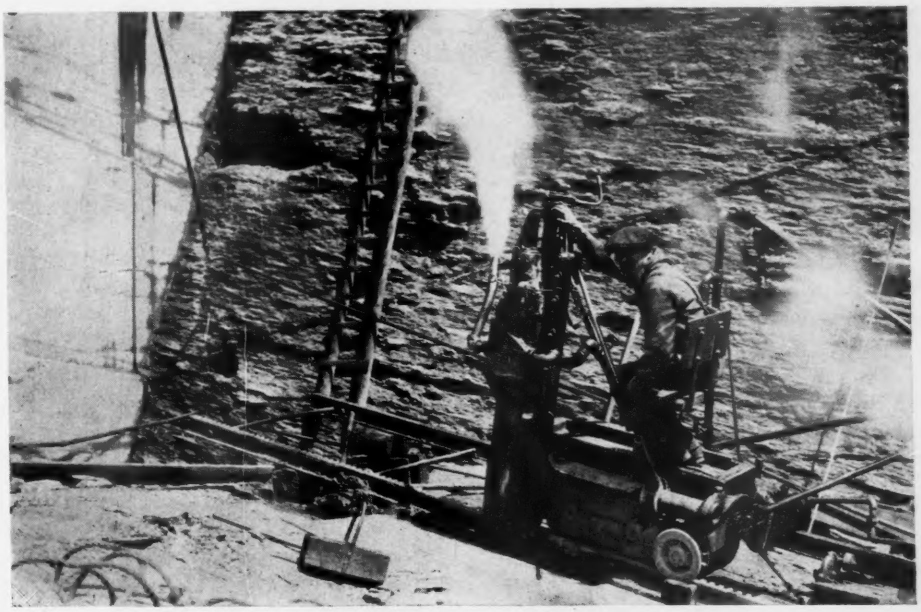
Excessive Waste Creates Demand for Better Methods

The enormous waste in slate quarrying, varying from 70% to 94% of gross production led the writer to urge upon operators the desirability of testing the wire saw equipment. The primary cuts in slate quarries in Pennsylvania are made chiefly with channeling machines as shown herewith. The channeling machine is a standard type of equipment that finds wide use not only in slate, but in marble, limestone and sandstone. It has a place in the quarrying industry even in slate, but the excessive waste that results from the stunning or shattering of slate makes it desirable to use some other type of equipment where conditions are favorable.

Co-operation of Slate Companies

In collaboration with W. S. Hays, secretary of the National Slate Association, it was arranged that five Pennsylvania slate companies would co-operate with the non-metallic Minerals Experiment Station of the Bureau of Mines in purchasing the equipment. The following operators volunteered to assist in the enterprise: R. S. Whitesall of the Hard Vein Slate Co., Arch Jones of the Amalgamated Slate Quarries, Harry Stoddard of D. Stoddard and Sons, William Blake of the Columbia Bangor Slate Co., and Clarence Dorey of the Dorey Slate Co.

An order was placed with a Belgian firm and delivery was made late in 1926. The bureau employed the temporary services of J. R. Thoenen, a mining engineer of wide experience. The machine was assembled and put in operation under his direction at the Colonial Slate Co. quarry near Wind Gap, Penn. The writer desires to express his appreciation of the cordial co-operation of Sidney Spry, president of the above company, in conducting the tests and in working out improvements in the design of the machine. The new mill owned by this company is one of the most modern in the district.



Channeling machine operating in a slate quarry

The new, modern mill of the Colonial Slate Co., Wind Gap, Penn.

The Wire Saw

The wire saw consists of a three-strand steel cable,

slightly more than 3/16-in. in dia., running as an endless belt. The wires used in the tests recently made were between 600 and 900 ft. long. The wire belt is driven by a 7½-hp. motor through belt and countershaft to give the desired speed reduction. The driving pulley is a double-grooved cast iron sheave 40 in. in dia. A special device provides the desired tension. A weight of 800 to 1000 lb. was found necessary in these experiments. Orienting pulleys

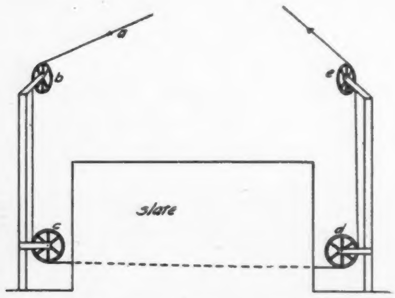


Fig. 1. Essential parts of wire saw equipment: (a) wire; (b) and (e) orienting pulleys; (c) and (d) guide pulleys

28 in. in dia. are provided for conducting the wire from the driving mechanism to the sheaves at the ends of the cut in the quarry. The pulleys may be adjusted radially, and a ball and socket joint permits orientation to suit the position of the cut. At each end of the saw cut a steel I-beam standard is provided as support for the saw guide sheave. The lower sheaves which guide the wire as it enters and leaves the cut may be

Sand box applying abrasive to the wire saw

raised or lowered on the I-beam standards.

The wire saw when in operation passes from the standard at one end of the cut through the slate to the second standard, thence to the drive mechanism and back to the first standard. Sand and water are fed to the saw and are drawn through the cut by it. The wire travels at the rate of 14.3 ft. per sec.

The arrangement of the equipment is shown diagramatically in Fig. 1. The wire (a) passes over the orienting pulley (b) to the guide pulley (c), through the cut to the guide pulley (d), the orienting pulley (e) and from thence to other orienting pulleys and to the driving mechanism on the quarry bank. The guide pulleys (c) and (d) are fed downward by worm gear to maintain pressure of the wire on the rock as the cut is worked downward. Sand is fed to the wire from V-shaped boxes. It is carried into

Wire saw about one foot from the bottom of a cut 9 ft. 8 in. deep

the cut by a small stream of water from rubber hose connected with a pipe line, and entering the upper end of the sand box. One of the sand boxes is shown below. Three boxes were used in the tests conducted, one being placed as close as possible to the point where the wire enters the rock. It was found by experiment that the stream of water should not be reduced too much and should occupy one-third to one-half the opening of a ¾-in. rubber hose. If insufficient water is supplied the sand rides on the wire, while a larger stream carries it beneath the wire where the effective cutting takes place. A sharp silica sand free from pebbles is desirable. If pebbles are abundant they gradually fill the cut, and make it difficult to supply sand to the wire.

The illustration above shows the layout of the equipment for a cut 80 ft. long and 8 ft. deep. The saw cut may be observed as a dark line on the rock surface between the two standards. The first sand box is close to the standard in the foreground, the second about one-third of the way across, and the third is located where the man in charge of the saw is stooped over. Another view shows the wire at the point where it leaves the rock on the 80-ft. cut. The center illustration shows the wire saw at a point about one foot from the bottom of a cut 9 ft. 8 in. deep.

Holes for Wire Saw Standards

It is obvious from Fig. 1 that holes or open benches must be provided in order that the movable guide pulleys may descend as the cut progresses. Where open benches are not present apparatus must be provided for sinking holes in the rock. The standard equipment for this purpose as purchased in Belgium consists of a welded steel drum 6 ft. long and 36 in. in dia. with metal teeth on its lower edge. It is driven at the rate of 70 r.p.m. by a 15-hp. motor, and, as sand and water are fed to it, it cuts out a drum, or core. When this core is removed a hole of sufficient size is provided to accommodate the standard and the lower 28-in.

Wire saw equipment in operation on an 80-ft. cut

sheave. The drum drill in operation appears on the next page. For most of the cuts the wire was run at an angle in order to conform with the inclined slatey cleavage, therefore the wire ran out at the surface at the upper end of the cut, and no standard hole was required. Also, as noted hereafter, two nearly parallel cuts were made about 5 ft. apart, and the slate between them removed. This provided a trench or channel in which the standard was placed for making cuts in a direction at right

angles to the trench and the former cuts.

The drum drill is not entirely satisfactory. Other types of equipment for sinking holes are being tried out and will be reported upon later.

The Channeling Machine

The present method of making wall cuts, and certain other cuts, as, for example, in opening up a new bench, is by means of a channeling machine operated on a track. The channeling machine costs approximately $5,000, requires two men to operate it, and cuts on an average about 50 sq. ft. of surface per day. It is a standard type of equipment in quarrying slate, marble, limestone and sandstone, but, as used in slate, it has serious limitations and disadvantages. Not only is it costly to purchase and expensive to operate, but, as it cuts by reciprocal motion in the same manner as a piston drill, the heavy blows of the steel shatter or "stun" the slate for a distance of 1 to 2 ft. on either side of the cut, thus causing excessive waste. The wire saw, on the other hand, cuts by a process of steady abrasion, and therefore causes no shattering.

Drum drill in operation cutting out a 36-in. core

Comparison of Cuts Made with Channeling Machine and Wire Saw

It was found by actual measurement that a channel cut 8 ft. deep in a Pennsylvania quarry is 3 in. wide at the top and 1¾ in. wide at the bottom, thus having an average width of 2⅜-in. The wire saw cut is ¼-in. wide.

The process of procuring a cut is essentially the chopping, pulverizing, or abrading and subsequent removal of the slate occupying the space of the cut. It is obvious from the above figures, and as indicated graphically in Fig. 2, that more than nine times as much material must be cut and removed by the channeling machine as by the wire saw in order to make a cut of the same surface area in each case. No data are now available on the relative amount of energy expended by the chopping method of the channeling machine as compared with the abrasive method of the wire saw. Assuming, however, that they are equally efficient, more than nine times as much work is expended in making the channel cut as in making the wire saw cut. Furthermore, the channeling machine expends additional energy in shattering the slate adjacent to the cut, energy which is worse than wasted in that it is destructive.

Theoretically, therefore, the wire saw should be much more economical than the channeler. Several factors contribute to the economy: (1) the power requirement is much lower, (2) the first cost is less than one-fourth that of a channeler, (3) the labor requirement is about one-half that of a channeler, (4) the cutting is more rapid and continuous, and (5) the proportion of waste rock is greatly reduced. To test out the soundness of the theoretical conclusions a series of tests were made, the results of which are given herewith.

Tests Made Under Bureau Direction

Records were maintained for five wire saw cuts made in the Colonial Slate Co. quarry. The diagram, Fig. 3, shows the relative positions of the various cuts. The figures in parentheses are the numbers assigned to the cuts as described in the following pages.

Cut No. 1

The drum drill was employed to make a hole for one standard, the other standard being placed on an open bench. For a hole 6½ ft. deep a total of 13 hr. 12 min. drilling time was required. The slate was in broken condition, in consequence of which many fragments slipped into the cut and were ground up by the drum. It was estimated that the drill operated in solid slate for 10 hr. 25 min. The average depth drilled per hour was 6½ in., and the maximum rate attained was 10 in. per hr. The abrasive employed was a sea sand, 96% of which would pass through a 20-mesh screen.

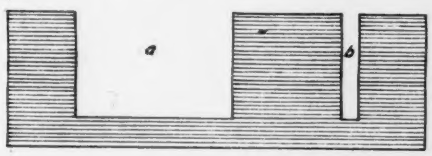


Fig. 2. Width of channel cut (a) compared with wire saw cut (b)

When the hole was completed and the core removed the standards were placed and a 670-ft. wire cable mounted on the sheaves. To make an endless belt the wire must be spliced, an operation which demands great care, for the splice must be smooth and even. Any projecting part will wear excessively, and will also tend to bind in the cut. The wire saw was in operation parts of three days on a cut 72 ft. long. A sea sand similar to that used with the drill was employed as abrasive. The measure of accomplishment is the surface area of the cut made, thus a cut 80 ft. long and 10 ft. deep would have a surface area of 800 sq. ft.

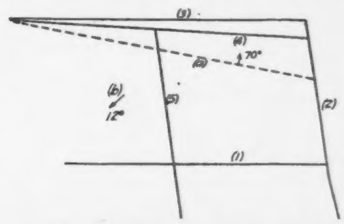


Fig. 3. Plan showing relative positions of experimental cuts. (a) direction of ribbon; (b) dip of slate cleavage

The following results were obtained:

	Hours
Total cutting time	8½
Total square feet cut	82.4
Average square feet per hour	9.7

Postponement of Tests

The above test was run in December, 1926, under unfavorable weather conditions. Further testing was suspended until spring, in consequence of which cut No. 1 was not completed. Cuts Nos. 2, 3, 4 and 5 were made during April and May, 1927. Unfortunately, the services of J. R. Thoenen were not available for these tests. The work was done under the general supervision of Sidney Spry, president of the Colonial Slate Co., and under the immediate direction of Floyd

The wire saw at the point where it leaves the cut

Wideman, an employee of the above company.

Cut No. 2

For cut No. 2, as shown in Fig. 4, one standard was much lower than the other in order to conform with the "split" or slatey cleavage of the rock, which, in the direction of this cut dips about 13 deg. The lower standard was placed at an open bench, and

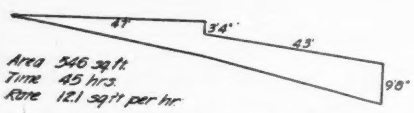


Fig. 4. Vertical section showing cut No. 2

as the wire ran out at the surface at the upper end no standard holes were required. Setting up the equipment ready to operate occupied the time of two men for two days.

A wire approximately 700 ft. long was used.

The record of the cut follows:

Length of cut on rock surface	90 ft.
Total area cut	546 sq. ft.
Total cutting time	45 hr.
Rate per hour	12.1 sq. ft.
Average cutting rate per 9-hr. day	109 sq. ft.

As indicated in Fig. 3, the cut crossed the ribbon (a) nearly at right angles.

Cut No. 3

As indicated in the diagram, Fig. 5, cut No. 3 was made in a direction almost at right angles to cut No. 2, thus intersecting the ribbon at a long angle. The wire was inclined about 11 deg. to conform with the slatey cleavage. A standard hole was cut in the corner of the quarry at the upper end of the cut, but on account of the inclination of the wire the completed cut reached a point only 11 in. downward from the top of the hole. Putting down a standard hole 6½ ft. deep with the drum drill required the time of one man for five days and a second man for four days and two hours. The lower standard was placed on an open bench. A wire about 750 ft. long was used. Following is the record of cut No. 3, which is shown diagramatically in Fig. 5:

Length of cut on rock surface	92 ft.
Max. depth of cut	11 ft. 10 in.
Total surface area	606 sq. ft.
Total cutting time	46 hr.
Rate per hour	14.5 sq. ft.
Average rate per 9 hour day	130.5 sq. ft.

Cut No. 4

Cut No. 4 was made nearly parallel with No. 3, being about 6 in. distant from it at the lower end and 5 ft. distant at the upper end. The purpose was to cut off a mass which when removed would leave a channel or trench in which the standard might be placed for cuts at right angles. Cut No. 5, described later, was made with the upper standard in this trench. The purpose in cutting out a wedge-shaped mass was to facilitate removal of material, for the wire saw cut being only one-fourth inch wide gives so little space that the masses of slate would jam and cause loss of time in their removal if the cuts were parallel. Placing equipment for this cut occupied the equivalent of seven hours time for one man.

Cut No. 4 suffered more interruption than previous cuts. An attempt was made to use the wire that made cut No. 5 in order to determine how completely a wire could be worn and still give service. Difficulty was first experienced in getting a smooth splice, and cutting had to be suspended to correct the splice. The old wire was run for 16 hours and then abandoned and a new wire substituted. The worn wire was found to be so smooth that it failed to carry the sand properly, and the cutting rate was very slow. This experience was valuable for it indicated that difficulty and loss of time will

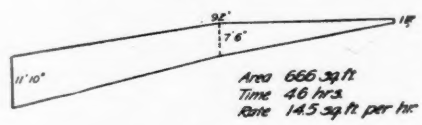


Fig. 5. Vertical section showing cut No. 3

result if an attempt is made to use a wire that has already served to make a cut. The cost of the wire is so small that it is undoubtedly more economical to begin every cut with a new wire. It is noteworthy also that no difficulty is experienced in introducing a new wire in the partly completed cut. On account of the slow progress with the old wire a total of 55 hours cutting time was required. The cut is practically identical with cut No. 3, and the record is as follows:

Upper standard for cut No. 5 placed in trench formed by cuts Nos. 3 and 4

Total surface area	666 sq. ft.
Total cutting time	55 hrs.
Rate per hour	12.1 sq. ft.

The total time devoted to this cut including set up and all interruptions was 10 days, giving an average of 66.6 sq. ft. per day total time.

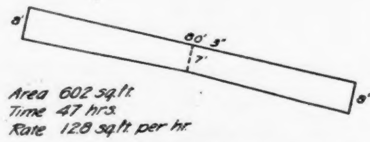


Fig. 6. Vertical section showing cut No. 5

Cut No. 5

As indicated in the diagram, Fig. 6, this cut was made with one of the standards in the trench formed by removal of the rock between cuts No. 3 and 4. The illustration below shows the upper standard for cut No. 5. The right hand wall of the trench was formed by cut No. 3, and the left hand wall by cut No. 4. The other standard was placed at an open bench. The cut was 80 ft. 3 in. long and 8 ft. deep. For this cut wire purchased from an American firm, the Waterbury Co., was used in place of the Belgian wire. It is the same diameter as the latter, but is more closely wound, each strand making a complete turn in one inch whereas in the Belgian wire one turn occupies 1⅛ in. The American wire apparently gives just as good service as the Belgian wire. A wire approximately 700 ft. long was used. Placing the standards, threading and splicing the wire ready to begin work required 8 hours time for one man. It is noteworthy that as experience is gained the time required for setting up is reduced. The following results were obtained:

Total surface area	602 sq. ft.
Total cutting time	47 hr.
Rate per hour	12.8 sq. ft.

Thus for the four cuts recorded above made in April and May a total of 2480 sq. ft. of surface was obtained in 193 hours running time, or an average of 12.8 sq. ft. per hour.

Cost of Wire Saw Operation

From the results of the above tests as complete data as possible have been compiled to determine the actual cost of operating the wire saw. The work done in December, 1926, being incomplete, is omitted. The costs are tabulated as follows:

LABOR

Putting down drill hole:	
1 man 5 days at $6 per day	$ 30.00
1 man 4 days 2 hr. at $6 per day	25.33
Placing wire saw:	
Cut No. 2	
1 man 2 days at $6 per day	12.00
1 man ½ day at $6 per day	3.00
Cut No. 3	
1 man 2 days 5 hr. at $6 per day	15.33
1 man 5 hr. at $6 per day	3.33
Cut No. 4	
1 man 7 hr. at $6 per day	4.67
Cut No. 5	
1 man 8 hr. at $6 per day	5.33
Sawing:	

Cut No. 2	
1 man 5 days at $6 per day	30.00
Cut No. 3	
1 man 5 days 1 hr. at $6 per day	30.67
Cut No. 4	
1 man 9 days 2 hr. at $6 per day	55.33
Cut No. 5	
1 man 5 days 2 hr. at $6 per day	31.33
POWER	
Drum drill, 15 hp., 11.2 kw. × 13 hr. = 146 kwh. at 2 cents	2.92
Wire saw, 7½ hp., 5.6 kw. × 193 hr. = 1081 kwh. at 2 cents	21.62
SAND	
10 tons at $2.80	28.00
WIRE	
2900 ft. at 9/10 cents per ft.	26.10
Oil, water and other incidentals (est.)	25.00
Amortization and repairs (est.)	50.00
Interest on investment, $1400 at 6% for 1⅔ months	11.67
Total	$411.63

Total area cut, 2480 sq. ft. Cost, 16.6 cents per sq. ft.

It is estimated that a channeling machine cuts an average of 50 sq. ft. per day, and that the total operating cost, including labor, supplies, power, repairs, interest and amortization is approximately $20 per day. Thus the channeling machine cost is about 40 cents per square foot, or about 2½ times as much as the cost of cutting with the wire.

It may be noted in the above calculation that only one standard hole was drilled, although four cuts were made, as three of the cuts ran out at the surface and no holes were needed.

Reduction in Waste by Use of Wire Saw

In previous pages attention has been directed mainly to rate and cost of cutting. The wire saw offers decided advantages also in conservation of slate. The channeling machine, as mentioned previously, shatters the slate on either side of the cut. The quarry operator always tries to make his channel cuts in inferior beds, but frequently cuts must be made across the beds of highest quality, and much waste results. The wire saw cuts by steady abrasion, and thus causes no shattering. Blocks 30 in. long were taken from the wedge-shaped mass of slate between cuts 3 and 4, were sent to the splitting shanty, and split into roofing slate directly from one wire saw out to the other. The smooth wire-cut surfaces are also of advantage to the splitter in the slate-making process.

Mill blocks with wire cut surfaces are found to be doubly advantageous. In the first place there is no necessity for removing 12 to 18 inches of shattered slate next to the cut surface, as is the case when channeling machines are used. Thus the waste is greatly reduced. In the second place the wire cut surface may constitute a face of the block, and the time and expense of an additional circular saw cut is saved.

It is planned that in future work in the quarry where the tests were made one set of wire saw cuts will follow a direction at right angles to the ribbon, and another set will be made to conform in direction and dip with the ribbon, possibly cutting in the ribbon itself. Thus the beds of clear stock would be preserved intact and the waste would be further reduced.

Other Advantages

A great advantage of the wire saw is its simplicity and ease of operation. The only attention required consists in maintaining a supply of sand in the sand boxes, regulating the streams of water carrying the sand into the cut, and, at intervals of about every half hour, feeding the guide pulleys at either end of the cut downward a distance of ½ to 1½ in. depending on the length of the cut and the cutting rate. One man can easily perform these duties and with much time to spare. If it is desirable to run overtime, the equipment being motor driven requires the extra time of one man only. It would be quite feasible in fact to supervise the operation on the basis of three 8-hour shifts per day, and to run the wire night and day continuously until a cut were completed. On the basis of the average rate of cutting already attained, about 300 sq. ft. of surface could be cut every 24 hours, that is, one wire saw operating continuously could do the work of 6 channeling machines working day shifts only.

Another advantage is the absence of equipment along the course of the cut. As there is no machinery or trackage in the way, slate blocks may be removed from points adjacent to the upper part of the cut while the wire is still in operation in the lower part of the cut. Such a course was followed during the recent tests without any detriment to the operation of the saw.

The ease with which cuts may be made at an angle to the vertical is a decided advantage. Cuts may be made approaching a horizontal position provided there is sufficient inclination to carry sand and water.

As the wire cuts in consequence of the downward thrust of the guide pulleys at either end, it is inevitable that in a cut 80 or 90 ft. long the wire will arch upward in the middle, in other words, when the cut is finished at the ends it will still be unfinished in the middle. The amount of this upward curvature has been the subject of considerable conjecture, some even going so far as to claim that the wire might be 5 ft. higher in the center than at the ends of a long cut. If such were the case, wire saw operation could scarcely be regarded as a success. Careful attention has, therefore, been given to this phase of the problem. Measurements and observation of some of the cuts already made indicate that the centers are not more than 6 in. to 1 ft. higher than the ends. The cutting down of the center to this extent is accomplished in two ways, first by maintaining a heavy tension, approximately 1000 lb. on the wire; and second, by running the wire for a period of three or four hours after the ends have reached bottom, thus cutting down the center and reducing the curvature.

From observations made up to the present time only two possible disadvantages appear. First, the saw cut is so narrow that difficulty may be experienced in removing blocks when a new bench is about to be opened up. A channel cut being about 2 in. wide gives considerable leeway, but, as the wire cut is only ¼-in. wide, blocks may jam if proper precautions are not taken. If a wedge-shaped mass is first removed, as between cuts 3 and 4 shown in Fig. 1, this difficulty may be overcome.

A second possible disadvantage is interference of the wire with other quarry operations. The wire passing from the driving mechanism on the bank over the quarry opening to the cut and back to the bank may cross the path of slate blocks and waste boxes as they are being hoisted and removed by means of the overhead cableways. Under such conditions hoisting must be conducted with great care to avoid interference with the wire. The wire saw may thus constitute a danger as well as a source of inconvenience. If the location of the driving mechanism and the course of the wire are worked out carefully the difficulty may be reduced to a minimum.

Summary

1. Tests recently conducted under normal quarry conditions indicate that the wire saw will cut about twice as fast as the channeling machine, and at about two-fifths of the cost per square foot of surface obtained.

2. The first cost of wire saw equipment is about one-fourth of a channeler.

3. Aside from some additional help in placing the equipment the wire saw requires only one man to operate it, whereas the channeling machine requires two men.

4. As the wire saw makes a narrow cut and causes no shattering the proportion of waste is greatly reduced.

5. The wire cut surfaces offer advantages in splitting blocks into roofing slates, and in reducing the number of saw cuts in finishing mill stock.

6. The wire saw lends itself readily to overtime work.

7. The narrow wire saw cut may cause binding of blocks during their removal unless a wedge-shaped mass is first removed.

8. The wire cable passing over the quarry may be a source of danger and inconvenience if proper precautions are not taken.

9. The most difficult part of the entire operation is the sinking of holes for the standards. Various methods are being tried out and the results will be given later.

10. Recognition of the success of the wire saw is already in evidence as follows:

First, the Colonial Slate Co., at whose quarry the tests were made, has dismantled one channeling machine, and the machine operator is now learning to run the wire saw.

Second, this company is purchasing for its own use complete wire saw equipment, part of which is already in operation.

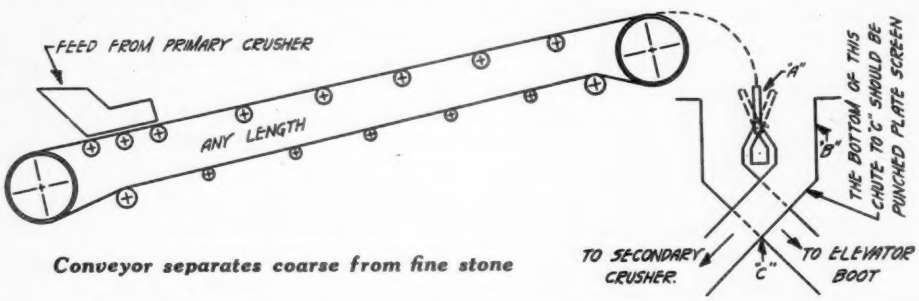
Hints and Helps for Superintendents

Conveyor Separates Coarse from Fine Stone

By W. L. HOME

Consulting Engineer, Pine Plains, N. Y.

IN many stone crushing plants the discharge from the primary breaker has no adequate screening before being fed to the secondary crushers. This condition works a hardship on the secondary crushers, causes breakdowns and retards their capacity. The remedy for this is to install proper screens, but where this cannot be done a cheap and fairly effective way is shown. Any resourceful mechanic can rig up a conveyor belt out of the scrap pile. This belt should be placed to receive the discharge from the primary breaker. If the primary breaker already discharges on a belt which feeds the secondary crusher, so much the better; but, if not, it could be placed at the discharge of a chute or elevator, or to receive the feed from whatever now feeds the secondary crusher.



Conveyor separates coarse from fine stone

By experimenting with the feed of the belt and the position of the hopper *B*, it will be found that the centrifugal force of the discharged stone will effect a fairly good separation between the coarse and the finely broken stone. Then by setting the butterfly valve *A* at a proper position to cut the stream of stone the fines can be separated from the coarse and be made to by-pass the crusher, the coarse going directly to the crusher feed.

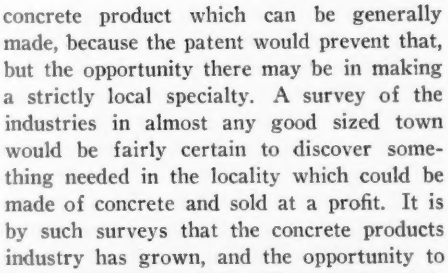
This equipment costs but little to install or operate and is perhaps more effective than the ordinary grizzly. A conveyor always makes a good feed for a crusher and gives an operator a chance to keep tramp iron out of the secondary crushers.

Profit in Concrete Specialties

SOMETHING over 600 forms of concrete products have been listed. Some of these are so local in their nature that they are only made by a single plant. One of these local specialties is illustrated in the cut, a lining for a well sunk in gravelly ground. It is made by the White Stone Co. of Memphis, Tenn.

The form of well lining was patented by a Memphis business man and the White company made arrangements with him for its manufacture. The idea of the lining is that it will pass sand and silt but not gravel. As soon as the well is down and lined it is pumped and the water sent to waste so long as sand and silt show in the pump discharge. When the water becomes clear it is ready for use. The sand and silt have then been pumped from the gravel, leaving a filter of gravel next to the well casing.

This is given as an example, not of a concrete product which can be generally made, because the patent would prevent that, but the opportunity there may be in making a strictly local specialty. A survey of the industries in almost any good sized town would be fairly certain to discover something needed in the locality which could be made of concrete and sold at a profit. It is by such surveys that the concrete products industry has grown, and the opportunity to increase this growth is still to be found in many places by the enterprising manufacturer of concrete products.



Concrete well lining—a specialty product for local use

Safety in Handling Explosives

SPEAKING before the recent Quarry Safety Conference at Toledo, J. Barab, Hercules Powder Co., Wilmington, Del., enunciated the following precautions for handling explosives:

No blasting caps, or other detonating or fulminating caps, or detonators, shall be kept or stored in any magazine in which other explosives are kept or stored.

Do not open a box of blasting caps or case of explosives near an open light, or in direct line with an air current or any place where sparks might fall onto the box.

Do not leave loose high explosives, black powder, or supplies exposed in any magazine.

Do not pile damaged or unsalable explosives with salable stocks.

Do not store any explosives where they are likely to get wet or absorb moisture.

Do not keep or use any style of metal tools in a magazine or store any commodities except explosives in the magazine.

Do not open packages of explosives or pack or repack explosives in a magazine or within 50 ft. of a magazine.

Do not leave explosives, especially blasting caps and electric blasting caps, lying around where children, people or live stock can meddle. Always keep them under lock and key in a suitable magazine.

Do not store any explosives in a dwelling, blacksmith shop, barn or any place where, in event of an accident, loss of life or property damage might result.

Do not store fuse in a hot or damp place. Fuse should be kept cool and dry.

Do not handle fuse carelessly in cold weather, for when cold it is stiff and breaks easily. It should be warmed slightly beforehand.

Do not use a magazine for a thawing house.

Do not store primed cartridges in a magazine, i.e., cartridges with detonators attached.

Do not try to take a blasting cap from a box with a wire or nail or by inserting any other sharp instrument.

Do not fasten a blasting cap to the fuse with the teeth or with a knife; use a cap crimper.

Do not try to open an electric blasting cap or pull the wire out of it.

Do not carry or transport blasting caps or electric blasting caps with other explosives. Keep them away from each other till ready to prime cartridge.

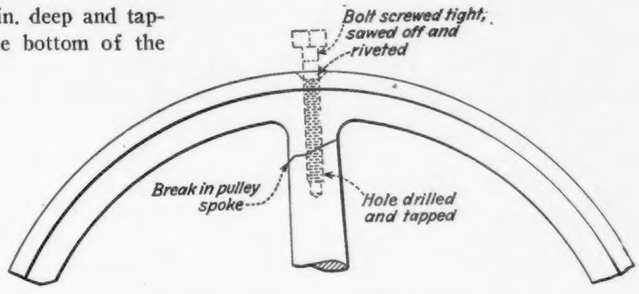
Do not smoke in the vicinity of explosives or when handling or using explosives.

Do not have matches about you when handling explosives.

Post magazine rules in every magazine and comply with them.

Repairing a Broken Pulley Spoke

THE spoke of a large iron pulley was broken in transit or through casting strains, and in the absence of another pulley it was necessary to repair it, which was done by drilling a ⅝-in. hole 3 in. deep and tapping it out to ¾ in. at the bottom of the threads. The hole in the rim was countersunk. A ¾-in. bolt was threaded for a length of 3 in. and screwed in tightly. It was sawed off 1/16 in. above the countersunk portion and the projecting end peened down and filed smooth. After a year of service the pulley was still in satisfactory condition.—Charles Labbe in *Engineering and Mining Journal.*



Repairing a broken pulley spoke

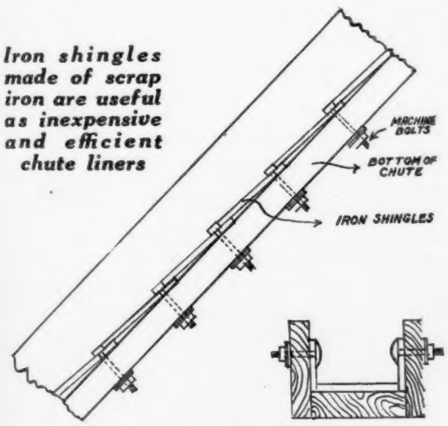
Method of Applying Chute Lining

By W. L. HOME
Consulting Engineer, Pine Plains, N. Y.

MANY crushing plants have unsatisfactory chutes and much chute trouble as a result of improper chute lining. On the other hand, the scrap piles have large quantities of bent and worn sheet iron of various thicknesses.

This method of lining a chute not only uses up much of this old iron but makes a better chute than the customary practice of using long, large, cumbersome, heavy pieces of iron to reach as far up the chute as possible. By using the iron shingles as shown, should wear occur at any particular point it requires just a few minutes' time for one man to replace the worn place with a new shingle, and it is not necessary to tear out and replace any large, heavy sections of iron because one place is worn through.

Iron shingles made of scrap iron are useful as inexpensive and efficient chute liners



The good part of the iron around the plant can be cut into shingles to fit the chutes. The shingles should be about 18 in. long and as wide as necessary to fit properly. They should overlap about ¾ in. and fastened to the chute by machine bolts placed far enough from the upper edges of the shingle so that when the shingle is in place the overlapping edge of the one above it will butt against the top edge of the head of the machine bolt. This will protect the head of the bolt and keep the exposed bolthead from obstructing the flow of material. The side liners may be long strips placed as shown in the sketch.

Quick Change Link for Sand Line Hitch

THERE are a great many uses to which a sand line can be applied and considerable hard labor around a drilling rig can be saved by the use of the sand line, providing the power is ample and the control of the sand reel is flexible.

By passing the sand line through a snatch block, which may be anchored at the foot of the derrick, the sand line may be used for skidding casing or for moving drill bits, drill stems or any heavy tools required around the derrick and which have been unloaded or piled some distance from the machine.

In blast hole drilling where bad formations are encountered, the jar bumper is sometimes used frequently and it is necessary to attach the sand line to this tool for operating.

Changing the sand line hitch from the jar bumper or using the sand line for some other purpose, which requires the hitch to be removed from the bailer, always causes delay and loss of time. About 10 minutes is required to change the sand line hitch, and in an effort to eliminate this waste of time some ingenious driller made the "quick change link" as shown here.

The use of this link enables the driller to change the sand line hitch from the bailer to the jar bumper, or vice versa, in a few seconds' time. It frequently happens that the jar bumper has done its work and released the tools from the bottom of the hole in less time than would be required to change the sand line hitch by the old method.

There may be some objections to running this link in the drill hole, but we know of several of them being in use for two or three years and we do not know of a single case where the link has failed to do its work or where it has caused any trouble.

Any blacksmith or tool dresser can make the link in less than one hour's time, the material required being a bar of ¾-in. round steel, 44 in. long, and a piece of ¾-in. pipe, 10 in. long. The pipe should slip freely over the ¾-in. round bar, and when the link is engaged the pipe will drop down to close the slot.—*The Armstrong Driller.*

Checking the Production of a Rotary Lime Kiln

By J. W. STOCKETT
Lee Lime Corp., Lee, Mass.

I HAVE developed a method for measuring the yield of quicklime which is of particular value in the plant control of a rotary kiln or a fine lime grinding plant.

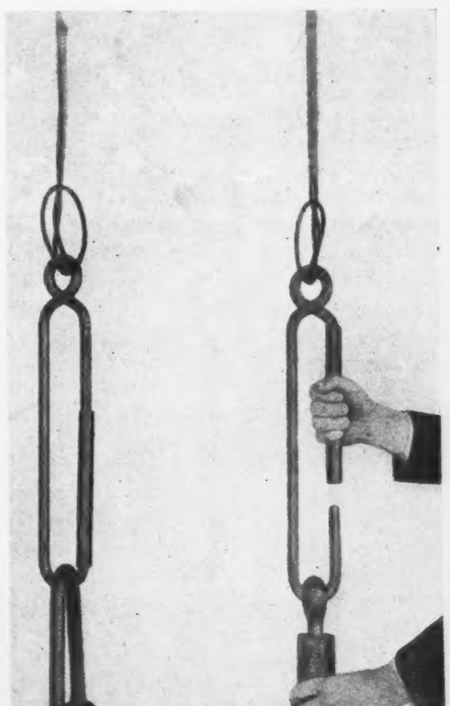
Procedure: Slake exactly 1 lb. of lime with sufficient water to give a paste, allow to cool and transfer to a 4-in. pipe set in a vertical position. For convenience the pipe should be 8 in. in height. Measure the number of inches of putty in the pipe. Multiply the inches of putty by 2, and the answer is the number of cubic feet of putty which would be obtained from one barrel (280 lb.) of lime. The derivation of this formula is given below:

$$\text{Cubic feet of putty/280 lb. lime} = \frac{4 \times \pi \times h \times 280}{1728} = 2.02h$$

Where h = height of putty in inches.

For all practical purposes the .02 is ignored.

I have found this a very rapid and convenient method for keeping an hourly check on the production of our rotary kiln.



Special link for changing sand line hitch on bailer or jar bumper

An X-Ray Study of Limes Having Different Plasticities*

By Marie Farnsworth

Nonmetallic Minerals Experiment Station, Bureau of Mines, New Brunswick, N. J.

[Two other articles dealing with the same subject were published in ROCK PRODUCTS, June 25 and July 23, 1927. These discussed briefly the history and applications of x-rays to various processes with emphasis on limestone and clay calcination. They were, in fact, somewhat simpler than the text given below and were expressly written with the purpose of gradually giving our readers a background for the more serious discussion which follows.]

ALTHOUGH lime-burning is one of the oldest known industries, there is very little scientific information in regard to it, especially in regard to plasticity. Some limestones will make a good finishing hydrate and other limestones with almost the same chemical composition will not; two limestones of very different chemical composition will often give equally good hydrates. Since the underlying cause does not seem to be chemical, it is natural to seek a physical explanation of this difference, and therefore an X-ray study of the basic materials involved and of hydrates of different plasticities was undertaken.

X-ray Methods

Owing to the nature of the materials to be studied, the pictures were limited to powder photographs as developed by Debye Scherrer[1] and independently by Hull.[2] The pictures were taken on a multiple diffraction apparatus (Fig. 1) in the research laboratory of applied chemistry of the Massachusetts Institute of Technology.[3]

Preliminary Experiments

Preliminary experiments were carried out using ordinary commercial samples. The samples were contained in small glass tubes; a plug of cotton was put in the middle and a sample of low plasticity was put in one end and a sample of high plasticity in the other end. If two oxides or two hydrates were employed, in all cases extra lines not occurring for the sample of high plasticity appeared on the film of the sample of low plasticity. If two carbonates were used (provided they had approximately the same chemical composition) no difference in lines was observed. These photographs were very complicated, as there were lines due to magnesium and calcium as well as to the impurities, so that it seemed almost impossible to analyze them completely. Therefore it was decided first to restrict the study to simpler substances, and for this reason only a very pure sample of white marble and Baker's analyzed C. P. precipitated calcium carbonate were employed.

MARBLE and precipitated calcium carbonate are burned in air at 1800 deg., 2000 deg. and 2200 deg. F. and marble in a vacuum furnace at temperatures from 1200 deg. to 2400 deg. F. in steps of 200 deg. F. The plasticities of the hydrates of all these samples are measured and X-ray powder photographs of the oxides and hydrates taken. The samples burned in a vacuum are found to be more plastic than the samples burned in air. The CaO samples which give a plastic hydrate give a face-centered cubic pattern with unit edge 4.79 Å; the plastic hydrates give a hexagonal pattern with an axial ratio 1.40. The patterns of the less plastic samples are complicated by additional lines corresponding, if CaO films, to strong lines of the $Ca(OH)_2$ and $CaCO_3$ films, and if $Ca(OH)_2$ films, to strong lines on the $CaCO_3$ film. In every case the intensity of these extra lines can be taken as a direct measure of the plasticity of the sample; these lines are the same for samples burned at high and low temperatures, but for samples burned at the higher temperatures the intensity is less. Experiments were not carried out with over-burned samples. Whether or not the $Ca(OH)_2$ and $CaCO_3$ are the cause of the decrease in plasticity of the lime, or simply an accompanying phenomenon, is discussed.

Calcination of Samples

It has recently been found by Haslam and Hermann[4] that the time and temperature of burning has a great influence on the resulting properties of lime, and that from the same sample of limestone either a plastic or non-plastic hydrate would result according to the temperature and length of time of burning. These observations were found to be true for marble and precipitated calcium carbonate. The samples were burned in an electric furnace which could be held constant within about 10 deg. F. After the desired temperature was reached and the furnace had had time to heat evenly, 2 to 3 kg. of the prepared limestone were dumped into the clay-graphite, porcelain-lined crucible. This cooled down the furnace, and a maximum time of 30 minutes was required to bring the furnace and its contents back to the desired temperature. The sample was heated in the furnace for three hours before the power was shut off and it was allowed to cool to room temperature.

The size of stone employed was 2 to 3 cm. In order that the burning of the finely divided calcium carbonate would be as nearly analogous to the marble as possible, it was made into lumps of approximately the same size by means of dextrin. During the burning the dextrin was burned out but the lumps still stuck together. At the lower temperatures there was some evidence of free carbon, but in no case did lines due to carbon appear on the films. After cooling it was removed and ground to pass through a 10-mesh screen and then put into tightly covered tin cans to prevent air-slaking. All runs were made in the same manner.

Hydration of Samples

A weighed amount of the lime was placed in a tin can set into a basin of running cold water. Enough water was measured out to hydrate the lime, with 50% excess to take care of evaporation. The water was added slowly and the mass was vigorously stirred to prevent the formation of lumps and local over-heating. This method produced a dry hydrate.

Determination of Plasticity

The plasticity of the various samples was tested according to the standard method of the American Society for Testing Materials. Three hundred grams of lime were hydrated and after aging for one day were formed into a putty by adding a sufficient quantity of water. This putty was allowed to soak for not more than 24 or less than 16 hours. It was then molded in a rubber ring such as is used with a Vicat needle, resting the specimen on a glass plate. The needle used was a modified form of Vicat needle, 12.5 mm. in diameter and weighing 30 grams, made from aluminum tubing. The lower end was closed without shoulder or curvature, and the tube loaded with shot to the

*Reprinted in abridged form from *Industrial and Engineering Chemistry*, May, 1927.

[1]Kgl. Gesell. Wiss., Gottingen, December, 1915; *Physik. Z.*, 17, 277 (1916).

[2]*Phys. Rev.*, 10, 661 (1917).

[3]Clark, Brugmann, and Aborn, *J. Optical Soc. Am.*, 12, 379 (1926).

[4]*Industrial and Engineering Chemistry*, 18, 960 (1926); ROCK PRODUCTS, October 30, 1926.

specified weight. It was mounted in a Vicat needle stand. The initial reading was taken with the bottom of the needle in contact with the surface of the sample; the final reading, 30 seconds after the plunger was released. A penetration of 20 mm. with a permissible variation of 5 mm. on either side was considered standard. If the penetration was less than standard, the sample was removed from the mold, mixed with more water and tested; if more than standard, the sample was discarded and a new one prepared.

The sample was then ready to test for plasticity. This was conducted on an improved form of the Emley plasticimeter, the constants of which were as follows:

Absorption of base plate: 20 to 25%.

Dimensions of base plate: 1 in. thick by 4 in. in dia.

Dimensions of disk: 1/32 in. thick by 3 in. in dia.

Speed of vertical shaft: one revolution in 6 minutes, 40 seconds.

Upward movement of base plate: 1/13 in. per revolution.

Torque on disk when bob reading is 100: 14,400 g.c.m.

The rubber ring previously mentioned was lubricated with a thin film of water placed on a porcelain base plate filled with the paste and struck off level. The mold was removed by raising it vertically without distorting the plate. The base plate and paste were placed in the instrument and the carriage was turned up by hand until the surface of the paste was in contact with the disk and the distance between the disk and the top of the base plate was 1¼ in. The carriage was then thrown into gear and the motor started exactly 120 seconds after the first portion of the paste had been put into the mold. The time when the first portion of the paste was put into the mold was recorded as zero time. The scale reading was recorded every minute until the test was completed.

The test was considered complete when (*a*) the scale reading reached 100, (*b*) any reading was less than the one before, (*c*) the scale reading remained constant for three consecutive readings (2 minutes) and the specimen had visibly ruptured or broken loose from the base plate. The time and scale reading at the end of the experiment were noted. The plasticity figure was calculated from the formula

$$P = \sqrt{F^2 + (10\,T)^2}$$

in which P is the plasticity figure, F is the scale reading at the end of the experiment, and T is the time in minutes from the instant the first portion of the paste was put into the mold to the end of the test. After

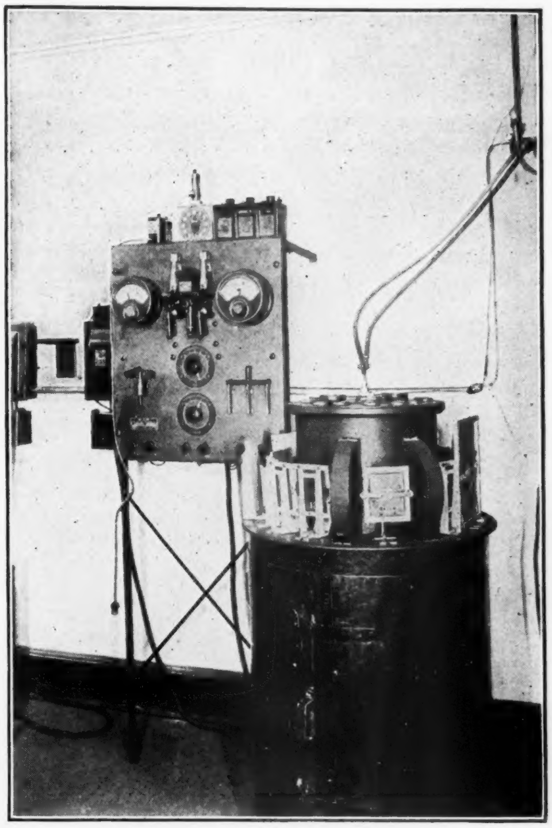


Fig. 1. Multiple X-ray spectograph

each test the porcelain base plate was washed with hot water, treated with dilute hydrochloric acid to remove any lime from the surface pores, washed again to remove the acid, dried by heating to about 100 deg. C. and cooled to room temperature before it was used again.

The results are shown in Table I.

TABLE I—PLASTICITY TESTS

Sample	Temperature of Burning Deg. F.	Plasticity $P=\sqrt{F^2+(10T)^2}$
Marble	1600	Not plastic; very sandy
Marble	1800	94
Marble	2000	192
Marble	2200	198
$CaCO_3$	1800	157
$CaCO_3$	2000	166
$CaCO_3$	2200	295

The sample of marble burned at 1600 deg. F. was very clearly not completely burned. Although the sample behaved like oxide in falling into small lumps, these small lumps were hard and obviously consisted mostly of marble. This was verified by X-ray photographs.

Calcination in a Vacuum

In order to test especially the effect of carbon dioxide vapor pressure, samples of marble were also burned in a graphite vacuum furnace. The crucibles for this furnace were quite small, so only about 300 grams could be burned at one time. The samples were burned as nearly like those burned in air as possible. As the sample could not be put in the furnace after it had been brought up to temperature, it was put into the cold furnace, about half an hour was allowed for the furnace to come to the correct temperature, and was then heated for 2½ hours at that temperature. The sample was allowed to cool and hydrated in identically the same manner as the air-burned samples. Unfortunately, no vacuum furnace was available that would burn large enough samples for testing the plasticity on the Emley plasticimeter. Therefore the Carson blotter test was employed and the samples could only be qualitatively compared among themselves and with the samples burned in air.

The Carson blotter test is essentially a duplication on a small scale of the action of a plasterer when spreading plaster on a wall. The wall is represented by a sheet of blotting paper, the trowel by a metal spatula. The lime was mixed with enough water to make a good plastering consistency and allowed to soak overnight. After soaking for 16 to 24 hours, the sample was spread out on the blotter with the spatula and its working qualities noted. The plastic samples work more easily and spread over a larger surface than the non-plastic ones. The Carson blotter test enables one to measure the rate of drying of the lime, and also the work required to spread the lime on the wall before it has dried. The Emley plasticimeter does the same thing, but naturally the conclusions to be drawn from the blotter test depend more upon the individual operator.

Samples burned in the vacuum furnace at 1200, 1400, 1600, 1800, 2000, 2200 and 2400 deg. F. were compared with the four marble samples burned at atmospheric pressure. All the vacuum samples were completely calcined, all hydrated rapidly and their plas-

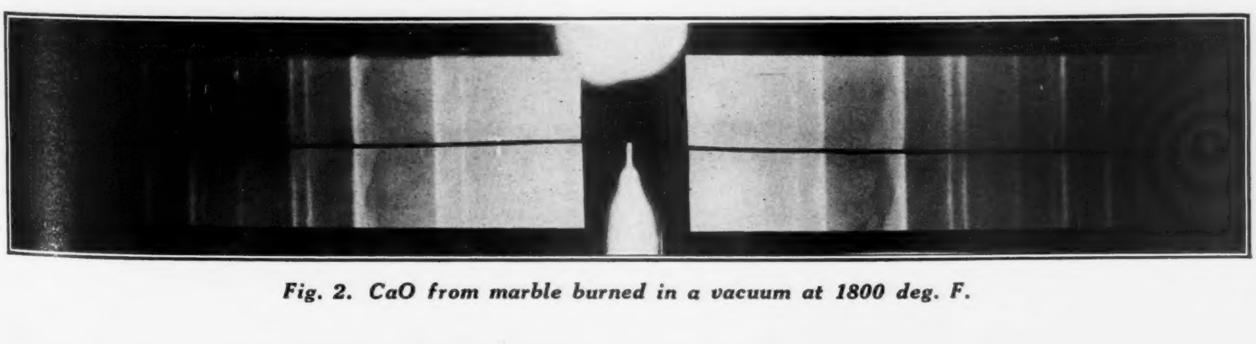


Fig. 2. CaO from marble burned in a vacuum at 1800 deg. F.

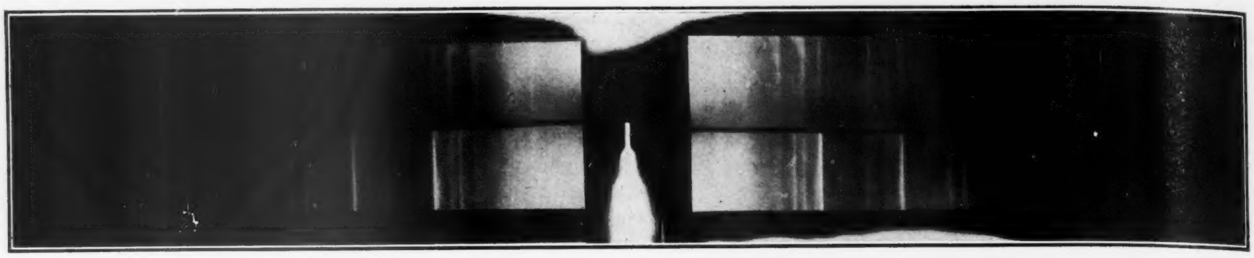


Fig. 3. CaO from marble burned in vacuum. Top—1800 deg F. and bottom 2200 deg. F.

ticity changed only very slowly as the temperature of burning was increased. There was not so much difference in plasticity between the 1200 deg. and 2000 deg. F. vacuum samples as between the 1800 deg. and 2000 deg. F. air-burned samples. While pointing out that the blotter test is only qualitative, it can be said that there was no vacuum-burned sample as poor in plasticity as the sample burned in air at 1800 deg. F.; in fact, the 2000 deg. F. air-burned sample was probably not so good as the worst vacuum sample. The sample burned in air at 2200 deg. F. was fairly plastic but not nearly so plastic as the best vacuum samples.

X-ray Results

X-ray photographs were taken of all these samples as described in the first part of the paper. Typical films are shown in Figs. 2 to 6. Fig. 2 is CaO from marble burned in a vacuum at 1800 deg. F. Fig. 3 is CaO from marble burned in air; the top part of the film shows a sample burned at 1800 deg F. and the lower part of the film shows the sample burned at 2200 deg. F. Fig. 4 is hydrate from marble burned in a vacuum; the top part of the film shows the sample burned at 1800 deg. F. and the lower part of the film shows the sample burned at 2400 deg. F. Fig. 5 is hydrate from precipitated calcium carbonate burned in air, the top part of the film shows the sample burned at 1800 deg. F. and the lower part of the film shows the sample burned at 2200 deg. F. Fig. 6 is a sample of calcium carbonate; this picture is the precipitated calcium carbonate used in the experiments; the marble employed gave an identical picture.

All the CaO samples burned in a vacuum gave films identical with Fig. 2, although in the film for the sample burned at 1200 deg. F. a few extra lines showed up very weakly. All the hydrate samples from marble burned in a vacuum gave films identically like Fig. 4, although analogous to the oxide, a few very weak extra lines showed up on the sample burned at 1200 deg. F. In all the samples burned in air, these same lines occurred as well as extra lines, although for the samples burned at 2200 deg. F. the extra lines were very weak and weaker for the precipitated carbonate sample (the plasticity here was higher) than for the marble. In every case, the intensity of these extra lines could be taken as a direct measure of the plasticity of the sample. (These lines were the same for samples burned at high and low temperatures, but for samples burned at the higher temperature the intensity was less.) The vacuum-burned samples (with the exception of the 1200 deg. F. sample) were more plastic than the air-burned samples and only with the 1200 deg. F. sample did extra lines occur. The 2200 deg. F. precipitated calcium carbonate sample was more plastic than the 2200 deg. F. marble sample and the extra lines on the oxide and hydrate films for it were weaker. The plasticities of the 1800 deg. and 2000 deg. F. precipitated calcium carbonate were very similar, as were also the x-ray films; the plasticities of the 2000 deg. and 2200 deg. F. marble were very similar, as were the x-ray films. In fact, by the intensity of these extra lines —i.e., lines not occurring on films for samples of the highest plasticity—we have a direct measure of the plasticity of the sample, qualitative if not quantitative.

The CaO samples burned in vacuum clearly gave the diffraction pattern of a face-centered cube. The pattern for this structure has the first nine lines grouped so as to form three repetitions of "a pair followed by a single line."

The 10th line, corresponding to the spacing $1/\sqrt{26}$, would be the first line of the next pair except that the second line of the pair would correspond to a spacing $1/\sqrt{28}$, which cannot exist. The sequence of "pair and one" is continued for three more groups after which it is broken up again by missing lines.

The positions of the lines and their intensities are given in Table II.

For definitely assigning a structure to these crystals the observed data as given in Table II and the curves as constructed by Davey[5] are used. An exact match for all the lines occurring on these films is found in the rhombohedral lattice at the axial ratio 2.45, the face-centered tetragonal lattice with axial ratio 1.00, and the body-centered tetragonal lattice with axial ratio 1.414, all of which are face-centered cubes. This is checked by a direct calculation of the density.

In a simple cubic space lattice the representative points are arranged at the corners of a series of cubes.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

Thus we can assume that CaO samples from marble which gives the most plastic hydrates consist practically entirely of CaO

TABLE II—CaO FILMS—MARBLE BURNED IN A VACUUM FROM 1400 DEG. TO 2400 DEG. F.

Intensity*	—Spacing of Planes— Observed Å.	Calculated Å.	Indices of Form
s	2.797	2.78	111
vs	2.42	2.39	010(2)
vs	1.717	1.71	110(2)
s	1.458	1.45	311
s	1.397	1.39	111(2)
m	1.210	1.19	200(2)
m	1.109	1.13	411
s	1.081	1.075	210(2)
s	0.986	0.982	211(2)
m	0.931	0.924	511
m	0.855	0.850	220(2)
m	0.816	0.822	530
m	0.805	0.812	531

*vs = very strong; s = strong; m = medium; w = weak; vw = very weak.

crystals, face-centered cubic with a unit edge 4.79 Å. (In reality, as accurate intensity measurements show, CaO is simple cubic with the calcium and oxygen atoms on alternate corners. In the powder photographs only the reflections from the calcium atoms are recorded and thus we get a face-centered cubic pattern.)

The position of the lines on the $Ca(OH)_2$ films from marble burned in a vacuum and their intensities are given in Table III. The method of calculating the spacings is the same as for the CaO films.

[5]*Gen. Elec. Rev.*, **23**, 565 (1922).

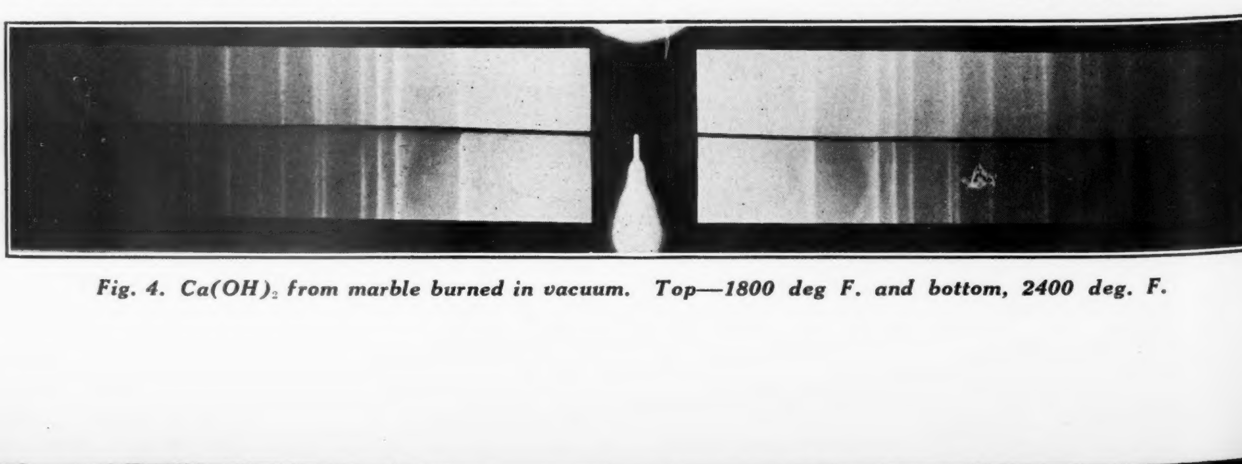


Fig. 4. $Ca(OH)_2$ from marble burned in vacuum. Top—1800 deg F. and bottom, 2400 deg. F.

TABLE III—$Ca(OH)_2$ FILMS—MARBLE BURNED IN A VACUUM—1400 DEG. TO 2400 DEG. F.

Intensity*	Spacing of Planes A.	Intensity*	Spacing of Planes A.
s	4.975	m	1.315
m	3.14	vw	1.232
vs	2.63	vw	1.215
s	1.925	vw	1.180
s	1.792	m	1.147
m	1.69	vw	1.127
vw	1.562	w	1.062
m	1.485	vw	1.042
m	1.457	w	1.03

*See footnote, Table II.

Using the data as given above and the curves as constructed by Davey,[6] a match is found in the triangular close-packed lattice of the hexagonal system at the axial ratio 1.40. The distance corresponding to the 10.0 planes is 3.14 A. This is the altitude of the equilateral triangle which forms the base of the unit prism. The side of the unit triangle is $2/\sqrt{3}$ times this distance. The density is 2.146, which is in fairly close agreement with the value 2.343 given in the International Critical Tables and the value 2.31 from accepted x-ray measurements.

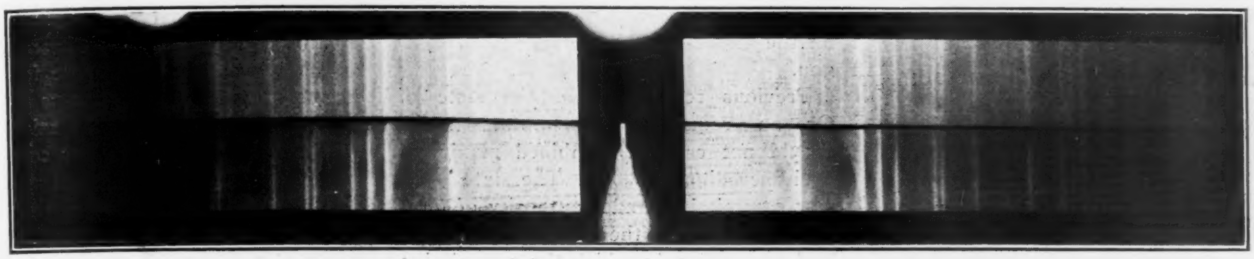


Fig. 5. $Ca(OH)_2$ from C. P. $CaCO_3$. Top—1800 deg F. and bottom 2200 deg. F.

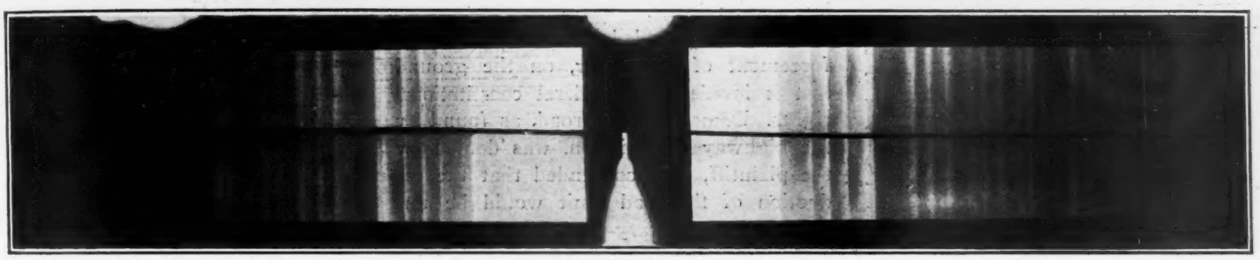


Fig. 6. C. P. $CaCO_3$

Thus, we can conclude that plastic hydrate samples from marble and calcium carbonate consist almost entirely of $Ca(OH)_2$ crystals with a hexagonal close-packed structure of axial ratio 1.40. Analogous data for calcium carbonate are given in Table IV.

TABLE IV—BAKER'S ANALYZED CALCIUM CARBONATE OR PURE MARBLE

Intensity*	Spacing of Planes A.	Intensity*	Spacing of Planes A.
m	3.88	vw	1.37
vs	3.06	vw	1.345
vw	2.86	w	1.31
s	2.52	w	1.26
s	2.305	w	1.245
s	2.115	w	1.187
s	1.93	m	1.165
s	1.89	m	1.055
m	1.615	w	1.019
m	1.53	w	0.992
vw	1.48	w	0.970
m	1.45	w	0.949

*See footnote, Table II.

A structure was not worked out for the calcium carbonate, for it was not essential for our purpose. Its structure is well known, however; it belongs to the rhombohedral class of the hexagonal system with which these data agree.

Since extra lines occurred on the photographs of air-burned samples, and not on those of vacuum-burned samples, it was natural to search for a cause of these extra lines in something that was present at atmospheric pressure and not in a vacuum. The two natural things to suspect would be carbon dioxide and water vapor, which would not be driven off so readily at atmospheric pressure as in a vacuum. The supposition was found to be correct. In all cases the extra lines on the films from non-plastic samples, if oxide films, correspond to strong lines on hydroxide and carbonate films, and if hydroxide films, to strong lines on the carbonate film. A tabulation of these extra lines is given in Table V for CaO samples.

TABLE V—EXTRA LINES OCCURRING ON CaO FILMS FROM SAMPLES BURNED IN AIR

Intensity*	Spacing of Planes A.	Agrees with
MARBLE		
Temperature—1800 Deg. F.		
s	5.00	$Ca(OH)_2$
vw	3.14	$Ca(OH)_2$
s	3.05	$CaCO_3$
s	2.66	$Ca(OH)_2$
w	2.305	$CaCO_3$
w	2.11	$CaCO_3$
s	1.94	$Ca(OH)_2$
w	1.89	$CaCO_3$
m	1.815	$Ca(OH)_2$
vw	1.156	$Ca(OH)_2$
vw	1.050	$CaCO_3$
Temperature—2200 Deg. F.		
m	5.00	$Ca(OH)_2$
vw	3.14	$Ca(OH)_2$
m	3.05	$CaCO_3$
m	2.65	$Ca(OH)_2$
vw	2.29	$CaCO_3$
vw	2.11	$CaCO_3$
m	1.935	$Ca(OH)_2$
w	1.81	$Ca(OH)_2$
vw	1.15	$Ca(OH)_2$
CALCIUM CARBONATE		
Temperature—1800 Deg. F.		
s	4.97	$Ca(OH)_2$
m	3.14	$Ca(OH)_2$
m	3.05	$CaCO_3$
s	2.65	$Ca(OH)_2$
vw	2.305	$CaCO_3$
vw	2.11	$CaCO_3$
m	1.935	$Ca(OH)_2$
m	1.81	$Ca(OH)_2$
vs	1.155	$Ca(OH)_2$
Temperature—2200 Deg. F.		
m	5.00	$Ca(OH)_2$
m	3.14	$Ca(OH)_2$
m	2.65	$Ca(OH)_2$
w	1.93	$Ca(OH)_2$
w	1.82	$Ca(OH)_2$
vw	1.155	$Ca(OH)_2$

*See footnote, Table II.

Judging from the intensities of the lines, a fairly large percentage of both $CaCO_3$ and $Ca(OH)_2$ was present in the samples of lowest plasticity. In the samples of highest plasticity (precipitated $CaCO_3$ burned at 2200 deg. F.) no carbonate lines were present. The $Ca(OH)_2$ present was apparently not due to contamination afterwards, as the samples were treated as nearly like the vacuum burned samples as possible and there was no contamination there. It was probably due to water not driven off at the temperature of burning.

A tabulation of the extra lines occurring on the $Ca(OH)_2$ films is given in Table VI.

TABLE VI—EXTRA LINES OCCURRING ON $Ca(OH)_2$ FILMS FROM SAMPLES BURNED IN AIR

Intensity*	Spacing of Planes A.	Agrees with
MARBLE		
Temperature—1800 Deg. F.		
vs	3.03	$CaCO_3$
m	2.49	$CaCO_3$
m	2.29	$CaCO_3$
m	2.10	$CaCO_3$
m	1.88	$CaCO_3$
vw	1.615	$CaCO_3$
Temperature—2200 Deg. F.		
w	3.01	$CaCO_3$
vw	2.49	$CaCO_3$
vw	2.29	$CaCO_3$
CALCIUM CARBONATE		
Temperature—1800 Deg. F.		
s	3.05	$CaCO_3$
w	2.51	$CaCO_3$
w	2.32	$CaCO_3$
w	2.11	$CaCO_3$
w	1.895	$CaCO_3$
Temperature—2200 Deg. F.		
No extra lines		

*See footnote Table II.

Here, again, there were no extra lines on the film of highest plasticity. However, in a film of $Ca(OH)_2$ from precipitated $CaCO_3$ burned in air at 2200 deg. F. and exposed for twice as long as the films were ordinarily exposed, extra carbonate lines did show up weakly. Thus, there is some carbonate present but in smaller amount than for the samples of lower plasticity. It

[6] Davey, *Phys. Rev.*, 21, 213 (1923).
[7] *Giorn. chim. ind. applicata*, 6, 333 (1924).

should also be noted that in some cases the positions of lines on the $Ca(OH)_2$ and $CaCO_3$ films, or on the CaO films, are identical and thus would not be tabulated in Tables V and VI.

The CaO and $Ca(OH)_2$ films from marble burned in air at 2000 deg. F. were almost identically like the analogous films for samples burned at 2200 deg. F. The CaO and $Ca(OH)_2$ films from precipitated calcium carbonate burned in air at 2000 deg. F. were almost identical with analogous films for the sample burned at 1800 deg. F., so no data are given for these films.

Discussion of Results

It is interesting to speculate as to whether or not the $Ca(OH)_2$ and $CaCO_3$ are the cause of the decrease in plasticity of the lime or simply an accompanying phenomenon. It is hard to see why $Ca(OH)_2$ present in lime should decrease the plasticity when it is all converted into $Ca(OH)_2$ before the plasticity is tested. However, the $Ca(OH)_2$ already present might act as centers of crystallization and thus give rise to larger crystals which would be less plastic. Since only $Ca(OH)_2$, and not $CaCO_3$, is present in appreciable amount in the more plastic air-burned samples, it may be only the $CaCO_3$ present which causes a decrease in plasticity. It is easy to see how $CaCO_3$ present in fairly large amount would decrease the plasticity by decreasing the amount of oxide present. By this it is not meant that a simple admixture of calcium carbonate would materially decrease the plasticity, but if the calcium carbonate coated some of the grains of oxide and slowed down the rate of hydration, the plasticity would be decreased. X-ray photographs of commercial samples show that calcium carbonate is always present in samples of low plasticity.

In the application of x-rays to lime plasticity we have a possible application to factory control. An x-ray photograph could be taken for each run and compared with a standard film for a sample of high plasticity. Extra lines would indicate a decrease in plasticity and the intensity of these extra lines would be a direct measure of this decrease. The presence of $Ca(OH)_2$ and $CaCO_3$ offers no explanation of the low plasticity of over-burned lime but here the additional complication of sintering enters. Owing to the lack of a suitable furnace, no tests were made with over-burned lime.

Acknowledgment

The writer wishes to thank the research laboratory of applied chemistry of the Massachusetts Institute of Technology for very kindly extending the complete facilities of the laboratory for carrying out this work, and especially Prof. George L. Clark, of the Massachusetts Institute of Technology, and Prof. Wheeler P. Davey, of the Pennsylvania State College, for their many helpful suggestions throughout the course of this work.

Right of State to Limit Highway Motor-Truck Traffic Upheld

RIGHT of a state to regulate maximum loads to be carried by motor vehicles within the state over roads constructed with both state and federal funds was upheld by the Supreme Court of the United States on April 18, 1927, in the decision rendered in the case of Morris et al. v. Duby et al. The court upheld the validity of state regulations.

The plaintiffs owned and operated for hire, under proper license, motor trucks on the Columbia River highway in Oregon.

Previous regulations of the state of Oregon required that motor trucks should not carry a combined maximum load exceeding 22,000 lb. The state highway commission, under authority of Oregon laws, reduced the maximum to 16,500 lb. by an order, in which the commission recited that the road was being damaged by heavier loads.

The plaintiffs filed a bill to enjoin enforcement of the order, on the ground that it invades their federal constitutional rights. Damage to the road, as found by the highway commission, was denied by the plaintiff, who contended that the reduction of the load limit would be unreasonable, arbitrary and discriminatory.

The allegation was made by the plaintiffs that they have been engaged in active competition with steam railroads paralleling the Columbia River highway, and charging rates of traffic which, unless the appellants can use trucks combined with loads of 22,000 lb., will prevent their doing business except at a loss.

The court stated that the acts of congress disclose no provision, express or implied, by which there is withheld from the states its ordinary police power to conserve the highways in the interest of the public and to prescribe such reasonable regulations for their use as may be wise to prevent injury and damage to them.

In this connection it was said:

"In the absence of national legislation especially covering the subject of interstate commerce, the state may rightly prescribe uniform regulations for their use as may be wise to prevent injury and damage to them.

"In the absence of national legislation especially covering the subject of interstate commerce, the state may rightly prescribe uniform regulations adapted to promote safety upon its highways and the conservation of their use applicable alike to vehicles moving in interstate commerce and those of its own citizens."

It was pointed out that the mere fact that a truck company may not make a profit unless it can use a truck with load weighing 22,000 or more lb. does not show that a regulation forbidding it is either discriminatory or unreasonable.

With regard to the allegation of impairment of obligation of contract it was said:

"Nor is there anything either in the federal or state legislation to support the argument that the agreement between the national and state governments requires that the weight of truck and load which was permitted by the state when the agreement was made binds the state contractually to continue permission."

It was held that the regulation was neither so arbitrary nor unreasonable as to defeat the useful purpose for which congress made contribution to bettering the highway systems of the union.

The decision of the lower courts was affirmed, in refusing to grant an injunction against the carrying of the regulations into effect.

New Steel Framed Dwelling Is Largely of Rock Products

EVER since the rapid increase in the use of rock products in dwellings (thus supplanting lumber) began, those interested in steel have been working to perfect steel frame construction for the same purpose. James G. Dudley, who has devoted the greater part of the last ten years to research in steel house construction, has a three-page article giving a successful method of building such houses in the *Iron Age* for July 21. The method combines a welded frame of steel channel irons with portland cement and gypsum products.

Flooring of art colored cement is recommended, combined with metal trim and doors, for the interior, to secure incombustibility. Bone-dry cellars (which the author rightly considers essential to the permanence of the structure) are to be made with reinforced concrete walls and floors and with integral waterproofing. Exterior sheathing is recommended to be of three-coat art colored and art textured portland cement stucco applied with a cement gun. This is to go on ribbed metal lathing rigidly anchored to the steel frame. For interior walls, wallboard is recommended, and to provide insulation a coating of fireproof plaster on the wallboard. Hollow walls, partitions and roof (materials not stated) are said to be easily secured, as they would be if standard cement and gypsum products were to be used.

The cost of such a structure, it is said, may be brought down to "wood cost" as soon as buildings of the kind are put up in such quantity that modern engineering and manufacturing practices may be used. Advantages offered by the steel frame structures are great freedom in architectural treatment, indestructibility as regards ordinary disintegrating agencies, and even freedom from the destructive effects of tornadoes and cycles.

B. F. Affleck—The Man and His Work

The Second of a Series of Interviews with the Outstanding Men in the Rock Products Industry

By Leon I. Thomas
Industrial Journalist and Author, Chicago, Ill.

"YOU ought to be ashamed of yourself." These words addressed to me by Mr. Affleck were justly brought forth by my own line of questioning—queries designed to bring out the human side of an extremely human executive.

But I was caught in my own trap. For I had placed before Mr. Affleck a clipping from the January 17 issue of the *Chicago Tribune* reading, "Commemorating the 221st anniversary of the birth of Benjamin Franklin, American patriot and statesman, the Benjamin Franklins, a society composed of men who bear his name, will hold memorial services today at the Benjamin Franklin statue in Lincoln Park. Benjamin Franklin Affleck, president of the society, will officiate, and Benjamin Franklin Bills will make the principal address." Then followed a long list of other "BF's" who were to be present.

"Why a society having such an unusual membership qualification? And why should one belong to it even if he could qualify?" Mr. Affleck's answers together with his counter question, "Have you ever read Franklin's autobiography?" which was what called forth his admonition to me quoted above, quickly brought out some of the objects of the society. Mr. Affleck reached toward a bookcase, one section of which contained nothing but copies of the Autobiography, and gave me one on condition I would read it.

How Mr. Affleck himself came to start this unique society is an interesting story in itself, a story which lack of space alone precludes telling here. But some of its objects should be mentioned because of the light they throw on but one phase of Mr. Affleck's interest in the public welfare.

Only once a year, on Franklin's birthday, does the society have any collective activity, but throughout the intervening twelve months its members, as occasion admits, do what they can to make Benjamin Franklin and his principles better known to the present generation. Just prior to the meeting, the society issues publicity material to the newspapers, approaches the preachers in the city with the suggestion that they allude to Franklin in their sermons on the nearest Sunday, circularize the radio broadcasting stations with similar suggestions for a timely feature for their programs.

Now that I have carried out my promise to read the book, the wisdom of Mr. Affleck's gentle reproof is evident to me as is the merit of the society and of its purposes.

Sensing from this unique activity the man's large interest in human relations it was but natural to ask concerning his ideas of management of men in industry. What of the employe representation plan, for example? Most readers will remember that this is a scheme of organization of employes within a company—a means designed to get the management's policies direct to the man in the ranks, and conversely to provide a medium for conveying the men's suggestions and grievances direct to the top. Mr. Affleck views such plans not only as unnecessary but too much laden with organization mechanism to accomplish their purpose as well as is done through foremen, superintendents and so on, who are well chosen for their knowledge of the human factor.

B. F. Affleck

"There are, of course," admits Mr. Affleck, "cases of arbitrary executives who do not give workmen a fair deal. In such a situation an employe representation plan might function to advantage, but those cases are relatively very few indeed.

"After all, what the employe wants, and all he wants, is a regular job at good wages. It is, in my opinion, a fiction that he wants authority, that he desires a share in the managerial responsibilities. Where there are men who really seek and are qualified to have authority they quickly stand out from their fellows and are picked for foremen, general foremen, assistant superintendents and so on.

"The management of a concern can use its time to considerably better advantage in selecting executives and sub-executives wisely than in building unwieldy employe organizations within the main business organization, and then spending still further time in making the plan work. Many employe representation plans have failed when the first enthusiasm withered into a condition devoid of interest."

Then, too, Mr. Affleck reasons, employe organizations of this sort involve the scattering of effectiveness so usual where responsibility is spread over a group instead of being placed squarely upon individuals. "Generally speaking, and for most purposes, committees of one are the only committees that amount to anything," says Mr. Affleck. "I don't believe in committee management. Sometimes, in our business, where it is necessary to bring to light, simultaneously, the points of view of several people—and this particularly occurs in connection with some of our production problems—we will hold committee meetings.

"BUT, and this 'but' is important, when the activities of a committee of this sort are to be continued to another meeting, the responsibility of carrying over the constructive thought and actions of the first meeting will be placed in one man's hands, and in only one man's. Then he is the fellow who is answerable, and he alone.

"With committees I have repeatedly seen things like the following happen: Say you put the plans of some construction job up to a committee of five. These five will go over the plans together. Later, a mistake is discovered. Now put it up to any member of the committee and he will probably say, 'I must confess I quite overlooked this error.' And so it will be with the other four too.

"On the other hand, if there were only one man in charge, it would be different. He would take the blueprints and go over them from top to bottom, from left to right, and from inside to outside. He would take the attitude, 'Now I'm the goat on this; it is strictly up to me.' It is only human nature to look at it this way.

"Even committees of three are not free from the evils of divided responsibility.

"Modern management deals with a mass of people, but after all a mass is only a

collection of individuals. You must choose the individuals who are qualified in the first place, and then apply to them such supervision as is dictated by a knowledge of human nature. Good results then follow naturally."

Important as Mr. Affleck considers the human element to be in business, he says there is a good deal of loose talk relative to the ever shortening work day and the increased wages that now prevail. "Most of the commendable gains in these directions have been possible not because of more efficient workmen, but rather through the increased use of labor-saving machinery.

"This fact, which should ever be kept in mind in a sound discussion of the subject, in the interests of truth, should also serve as a challenge to all of us executives, for herein lies our salvation as successful business men. Allow me to take from our business an example of the possibility of greater output per man employed: Not long ago we threw out 20 old grinding machines and in their places put in eight modern, efficient ones. True, this called for a large capital investment, but it reduced the number of men required in that particular case from 17 to seven."

Having observed what some people think is a present trend away from the extensive simplification and standardization program sponsored for the past few years by the United States Department of Commerce, I ventured to ask Mr. Affleck's opinion of the original movement. Quick as a flash came back the answer: "Simplification is the greatest single thing Mr. Hoover has done for American business. Great as are the advantages of standardization, there will always be the danger of breaking away from it — a danger brought about through the temptation to yield to narrow thinking on a short-sighted basis, if such a mixed figure of speech is allowable.

"No argument should be necessary with any of us in the portland cement industry to prove the advantages of standardization to all concerned. We should be proud of the fact that we were one of the first industries to get itself out of the former chaos into the present standardized status. Supposing we had to go back to those days before President Taft applied standard specifications to government purchases, by executive order, and thus gave such a helpful push to the movement toward general standardization in the industry.

"And yet in recent years we do see some companies occasionally trying to improve their commercial standing by adopting super-standards. None of us wants to stand in the way of progress, but when companies in the scramble for business raise the specification of cement up to 350 and 400 pounds tensile strength, no good is accomplished in the long run. Under the present approved standards, an engineer in New York can design a water power development for construction in Maine or for California, and get equal results with materials readily obtainable in either place.

"It is very likely true that you can't apply simplification and standardization to style products even if you would want to. The economic waste which results from lack of simplification in style products is the penalty we gladly pay for not looking all alike. But such a waste is not excusable in our line of industry.

"Much as I feel that we, in common with most manufacturers, are indebted to Mr. Hoover for his efforts in the direction of simplification and standardization, I do not think that this should lead us into the attitude of leaning too heavily on the government for help. We may not, in fact, we almost surely shall not, always have a man of Mr. Hoover's outstanding constructive qualities heading up the Department of Commerce.

"There is a danger, and a very real one, of relaxing our efforts toward helping ourselves. If we get the habit of running to the government with all our ills, we may some day be without a strong man in Washington and find ourselves a race of executive weaklings."

Editor's Note

THIS is the second of a series of similar interviews, with leaders in the Rock Products Industries, which we expect to publish regularly during the current year.

The author, Leon I. Thomas, is a well-known writer and journalist, having served on the editorial staff of the A. W. Shaw Co., publishers of "System" and "Factory."

Mr. Thomas is one of the editors and co-author of "Library of Factory Management" and other books and articles on management.

In a general way his interviews will deal with the business philosophies of the prominent men who manage large rock products business enterprises.

Beautifying the Grounds About a Cement Plant

AN industrial plant is a desirable asset to any city. However, only too often the owners of the factory have expended their money on making the plant look just what it is intended for—an utilitarian project. And accordingly the surroundings have been neglected, so that the towns-people are almost apologetic in pointing it out to visitors. They have pride in its being located in their city, but are often not too proud of its appearance. But it is always pleasant to relate of departures, particularly where they are rock products plants. One such is the cement mill of the Ash Grove Lime and Portland Cement Co., at Chanute, Kas., from which the item from a local newspaper commenting on its attractive appearance follows:

"Perhaps the most beautiful lawn in this section of the country may be seen now at the plant of the Ash Grove Lime and Portland Cement Co., north of the city. In the grounds and about the entrance to the plant are five acres of blue grass, with sprinklings of clover, red top and English rye grass. There is not a weed in the tract and the grass is as thick and as handsome as a lawn can look.

"In the landscaping plan are also great showings of spirea and Darwin tulips. The flowers have suffered some the past ten days during the downpours, but they are still beautiful. While the rains have detracted from these, the unusual moisture has been beneficial to the blue grass, which is worth anybody's time to see at this time. Take a drive from the highway west over the slab to the plant, circle the administration building, and return. The scene is worth while.

"Three years ago Carl Hansen began landscaping the premises about the plant. His first work was to plant shrubbery and grass about the building at the end of the drive. This is now at its best. Mr. Hansen's next job was getting a stand of grass on both sides of the drive to the highway and inducing rows of Lombard poplars to grow on both sides. The results are splendid, despite floods and dry weather last summer.

"The next task was to improve several acres on each side of the drive. Mr. Hansen succeeded in getting a stand of alfalfa there, so as to have something green and vegetation that will keep the ground from washing. He already has a good stand of spirea the entire distance along the highway.

"A trip to the Ash Grove plant is worth while now to see what Mr. Hansen has accomplished in three years. In another two or three weeks the climbing roses that spread over a wire fence between the office building and the mill will be at their best, with an abundance of white, pink, red and yellow roses."

L. T. Sunderland, president of the company, has written us further on the landscaping around the plant. He says:

"An 18-ft. concrete driveway constitutes the approach to and circles around our plant office building. The straight approach is lined on both sides with Lombardy poplars and the circle is bordered with spirea. Between the office and the plant are flowerbeds, and a high wire fence mounted on concrete posts forms a trellis for several varieties of climbing roses, such as climbing American Beauties, Dorothy Perkins, et al. I think the entire setting is one of the most beautiful to be found at any cement plant in America, it being our aim to have it attractive and consistent with the high character of our product."

Missouri Portland to Build Cement Plant in Arkansas

THE expenditure of approximately $1,500,000 in the construction of a cement manufacturing plant in Independence county, at a point near Batesville, Ark., by the Missouri Portland Cement Co., will be undertaken in the near future, according to a report in the *Batesville* (Ark.) *Guard*.

The capacity of the plant will be approximately 1500 bbl. of cement per day. Deposits of limestone and shale about seven miles north of Batesville, near the tracks of the Missouri Pacific railroad, will be the raw material sources.

Ideal Cement to Build Mill at White Cliffs, Ark.

A 3000 BBL. per day cement mill at White Cliffs, Ark., is under way by the Ideal Cement Co., Denver, Colo., according to a recent announcement in the *Mena* (Ark.) *Star*. Construction on the new $2,000,000 plant already has been started by the company's engineers and it is expected to be completed and in operation by May 1, 1928. The location is on a 1280-acre property, near White Cliffs.

In addition to the two sections of land purchased by the company for the plant site, the company has purchased a short line railroad that connects the village of White Cliffs with the Missouri Pacific, Frisco and Kansas City Southern railroads.

The Arkansas plant will be the tenth operated by the Ideal company, which now operates three plants in Colorado, two in Montana, one in Nebraska, one in Utah and two in Oklahoma.

The recent approval by the Arkansas supreme court of the $52,000,000 bond issue which is to be expended in the next four years for highways is advanced as a reason for the proposed new cement mill. Thirteen million dollars of this issue have already been underwritten, it is said.

Develop Cape Girardeau Silica

DEVELOPMENT of the clay and silica deposits in the vicinity of Cape Girardeau, Mo., is the purpose for organization of the Cape Silica Co. there. The company, capitalized at $250,000, is composed largely of Chicago men who became interested in the project after their engineers had made extensive investigation.

The deposits in the vicinity have been known for quite a time and some mining done on a small scale at different periods. The part to be developed lies about three miles northwest of Cape Girardeau. The company is reported to have acquired a plant site on this location. A bond issue of $150,000 will be offered to eastern investors, the proceeds to be used in development work and plant construction and equipment. It is said $125,000 has been paid up.

Wm. Bender of Naperville, Ill., is president, Ed Tarron of Kankakee, Ill., is vice-president, D. C. Smith of Cape Girardeau is secretary, D. P. Scott of Kankakee is treasurer, and J. W. Ford of Cape Girardeau is general manager.—*Cape Girardeau* (Mo.) *Missourian*.

"Carl D. Bradley" Completes Maiden Voyage

THE biggest boat that ever plowed the Great Lakes bearing the largest cargo ever carried on the lakes completed her maiden trip Saturday, July 30, when the steamer, Carl D. Bradley, nosed her way into the new Buffington Harbor, Indiana, which recently was dedicated by Vice-President Charles G. Dawes. Immediately upon her arrival the new boat began with her own automatic electrical machinery to discharge her own 15,000-ton load of limestone at the rate of a ton a second.

The "Bradley" discharging limestone at the rate of one ton a second

Six hundred and thirty-eight feet long, 65 ft. wide, 33 ft. deep and costing over a million dollars, the new steel freighter was built specially to carry limestone from the world's largest quarries at Calcite, Mich., to Buffington Harbor at the Chicago plant of the Universal Portland Cement Co., which is one of the few harbors on the Great Lakes deep enough to accommodate it.

Carl D. Bradley, president of the Michigan Limestone and Chemical Co., and of the Bradley Transportation Co., for whom the new boat is named, is credited with developing the modern self-unloading type of freighter of which this is the newest example. At the dock when the vessel arrived was a group of officials from Chicago headed by B. F. Affleck, president of the cement company wihch built the harbor.

Contractors' Convention to Follow Crushed Stone at West Baden

AS announced in ROCK PRODUCTS, August 6, p. 77, the next annual convention of the National Crushed Stone Association will be held at West Baden, Ind. The dates are January 16, 17, 18 and 19, 1928. The Road Show and the annual convention of the American Road Builders' Association will be held in Cleveland the week preceding, or the week of January 8-14, 1928. It is also a matter of considerable interest to the crushed-stone industry that the Associated General Contractors of America will hold their annual convention at West Baden, Ind., the week following that of the Crushed Stone Association, or the week of January 23-27, 1928.

Both conventions will be held at the West Baden Springs Hotel, which is a famous resort hotel during the spring and fall seasons. Special American-plan rates will be in effect for both conventions.

According to plans announced recently by R. C. Marshall, Jr., Washington, general manager of the Associated General Contractors, all important methods used throughout the general construction industries will be shown in a series of exhibits, which will demonstrate all types of construction materials, supplies and accessories for industrial, engineering, transportation and specialty buildings projects. Prizes will be awarded for the most effective displays.

The Manufacturers' Division of the National Crushed Stone Association will hold its usual exhibit. The space provided in the rotunda, under what is said to be the largest dome in the United States, is ample for an exhibit of full-size equipment. Doubtless many manufacturers of equipment will avail themselves of the opportunity to exhibit at both conventions.

Gravel Plant Washing and Screening Equipment and Design

Part No. II—Types of Scrubbers and Their Application

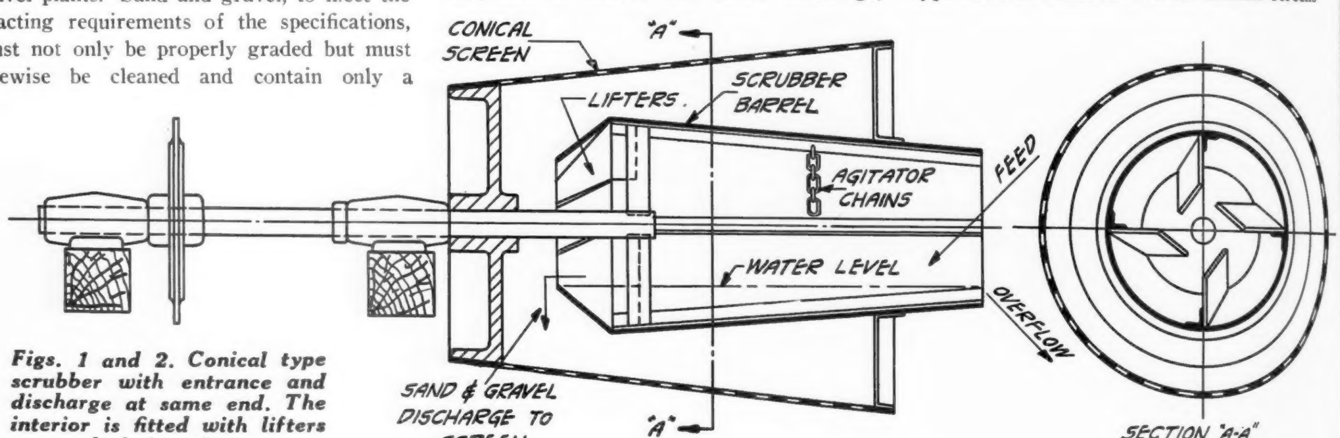
By Hugo W. Weimer
Consulting Engineer, Milwaukee, Wis.

IN Part No. I of this series of articles appearing in July 23, 1927, issue of ROCK PRODUCTS the writer attempted to briefly illustrate the various types or designs of screening equipment suitable for and commonly used in the present day sand and gravel plants. Sand and gravel, to meet the exacting requirements of the specifications, must not only be properly graded but must likewise be cleaned and contain only a nominal percentage of silt, mud or clay.

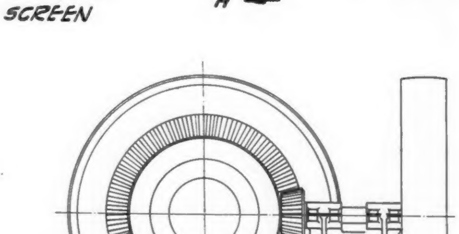
To meet this condition practically every plant today must wash its products and, furthermore, in many cases, preliminary scrubbing is necessary to agitate the material and loosen the dirt. The proper use and application of some scrubbing device makes possible the use of aggregate that would otherwise not pass specifications. Even with this device many deposits are valueless because it is not yet commercially possible to properly wash and clean the material they contain.

Some types of scrubbers are made a part of the sizing and washing screens while others are a separate unit, placed ahead of the screens. Most of the scrubbers used today are of the rotary type having lifters and retaining rings to thoroughly agitate the material before the entire discharge, consisting of water, sand and gravel, is passed on to the sizing screens. There are, however, a number of designs permitting the separation of the dirty water at the scrubber.

Figures No. 1 and 2 illustrate a popular type used in connection with conical screens of the design with entrance and discharge at the same end but without interior shaft. This is in reality a scrubbing barrel placed inside of the standard screen of this type. The scrubber itself is also conical in shape and the material is spouted into the far end. The interior is fitted with lifters and short lengths of chain which lift and also agitate the material, which gradually moves forward owing to the conical shape. At the large diameter end another cone is fitted which is provided with lifting blades which carry the material upward and discharge it



Figs. 1 and 2. Conical type scrubber with entrance and discharge at same end. The interior is fitted with lifters and chain agitators.



Driving end section of scrubber shown in Fig. 3

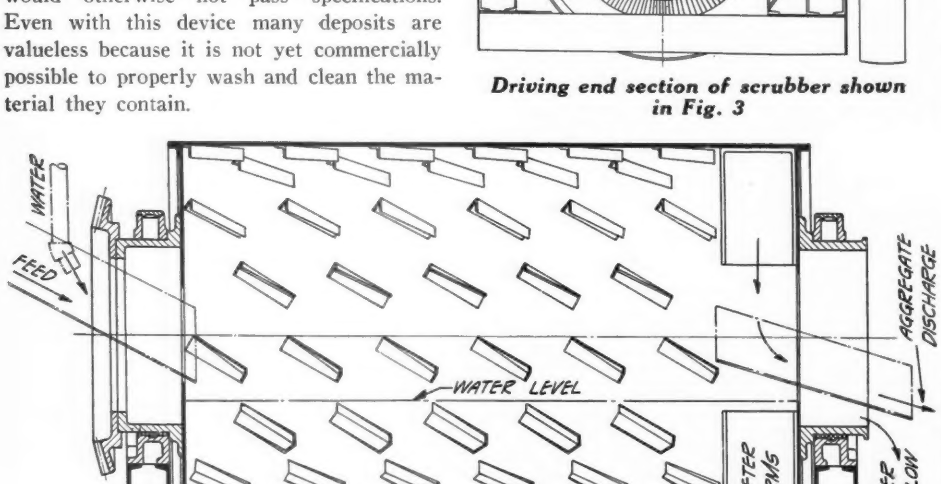
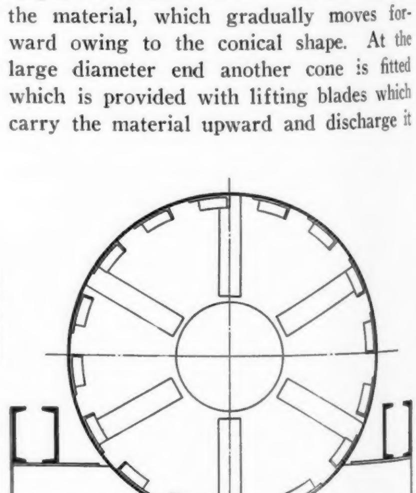


Fig. 3. Scrubber of the rotating barrel type



Discharge end of scrubber illustrated at left (Fig. 3)

through the circular opening in the end. At the feed end of this scrubber the excess water and refuse material is discharged. Thus the material received by the screen consists of a small percentage of the water, together with all of the gravel and practically all of the sand, all of which has been thoroughly agitated in passing through the scrubber.

Another type of scrubber which also permits the separation of dirty water from the sand and gravel is illustrated in figure No. 3. Figure No. 3 illustrates a design of heavy construction having the barrel rotating in large diameter bearings at each end, but another type commonly used has a riding ring at each end which is supported on two rollers. The driving of this type is accom-

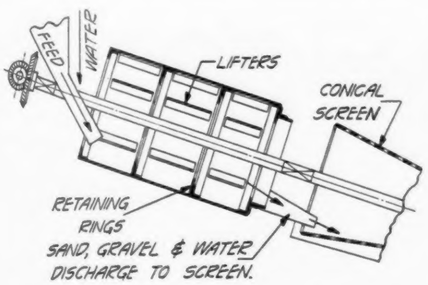


Fig. 4. Cross section of cylindrical type scrubber used as a separate unit with conical screens.

plished by rotating the roller shafts which move the drum by traction between the rollers and riding rings.

This design of scrubber is set horizontally and the material and water are fed into one end. The shell has interior lifters placed at an angle which not only lift the material to properly agitate it, but also move it toward the discharge end. The circular opening in the discharge end is larger in diameter than the one at the feed end, which permits of the entrance of the gravel discharge spout and at the same time brings the water overflow to the discharge end. In the interior of the shell directly at the discharge end, elevating lifters are placed which carry the gravel upward and discharge it into the sloping spout. The excess dirty water and foreign material is also dis-

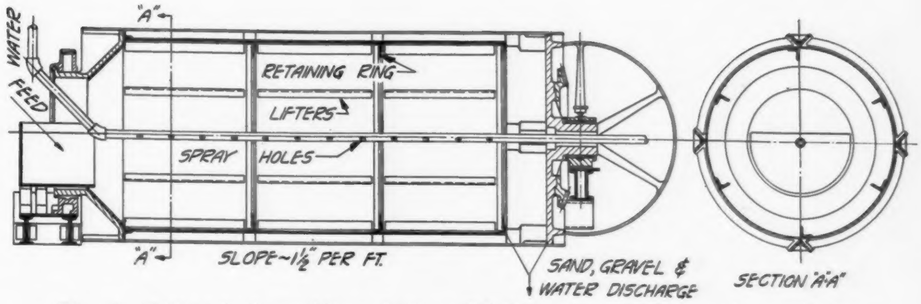


Fig. 5. Cylindrical scrubber of the solid drum type with interior retaining rings and longitudinal iron lifters.

charged through the head which surrounds the gravel discharge spout. This design is of general interest but it is seldom necessary or advisable to make use of this particular type in sand and gravel washing.

Figure No. 4 is a cross section of a cylindrical type of scrubber as a separate unit often used in connection with the popular type of conical screens which are mounted on a single shaft. It consists of a solid cylindrical shell with internal retaining rings to retard the progress of the material and lifting angle irons which alternately raise and drop the material into the bath of water. The entire contents is discharged into the screens following for washing and sizing.

Another type of rotary scrubber that is a separate unit is shown in Fig. No. 5. It is very similar in construction to the ordinary rotary cylindrical screen, the principal difference being that instead of being made with perforated screen sections the entire drum is of steel plate and has the interior fitted with circular retaining rings and longitudinal angle iron lifters. The material is fed into one end (usually with a certain amount of water) and a water pipe passes through the center, provided with holes for spraying the material, and furnishing additional water. The entire contents are discharged at the other end and passed on through screens for further washing and for sizing.

An arrangement extensively used with excellent results is the combination of scrubber and rotary cylindrical screen in one unit. The design is practically the same as the ordinary cylindrical screen excepting that a solid steel shell is placed ahead of the sand jacket and first screen section and this constitutes the scrubber. This makes the addition of the scrubber an item of small expense. Figure No. 6 shows respectively a sectional view of one of the rotary cylindrical combination scrubber and screens. The section illustrates in detail how the scrubber is placed between the feed head of the screen and the first perforated section. It is a compact unit and the central water pipe passing through the entire length of the screen not only provides the additional water required for the scrubber, but also washes the material thoroughly before it passes on over the first section, which takes out all the dirt, sand, small gravel and water. This pipe is provided with spray holes the full length of the scrubber and the sand jacket.

Each type of scrubber for this industry has its advocate and good results are being obtained from all of them. But certainly the operator, engineer or student who is interested in sand and gravel washing can

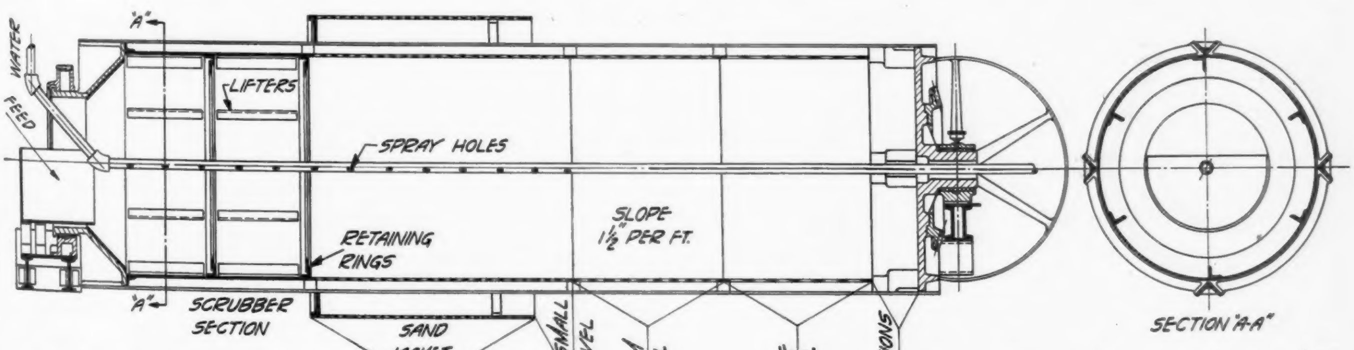


Fig. 6. Sectional view of combination rotary scrubber and screen.

best understand the process if he is somewhat familiar with all the designs and methods used in actual practice.

Find New Iowa Gravel Deposit

LOCAL Iowa papers say that a gravel dedeposit, large enough to be worked on a commercial scale, has been discovered by State Geologist R. P. Jones near Malvern.

As the state is short of gravel for road building purposes, the finding of this deposit is considered of more than local importance. Mr. Jones also noted that limestone bluffs near Folsom might furnish crushed stone for road material.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[32]	May 24	....	1½	3	
Allentown Portland Cement Co. (6% bonds, 1932)[32]	May 24	....	87	92	
Alpha Portland Cement Co. (common)[2] new stock	Aug. 16	No par	38	41	75c quar. July 15
Alpha Portland Cement Co. (preferred)[2]	Aug. 16	100	115	....	1¾% quar. June 15
American Lime and Stone Co. (7% bonds, 1942)[32]	May 24	....	39	39½	
Arundel Corporation (sand and gravel—new stock)	Aug. 17	No par	39	39½	50c July 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Aug. 18	....	119	121	
Atlas Portland Cement Co. (common)[2]	Aug. 17	No par	42	44	50c qu. June 1
Atlas Portland Cement Co. (preferred)	....	100	....	....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	Aug. 17	33⅓	43	....	2% quar. July 1
Beaver Portland Cement Co. (1st Mort. 7's)[8]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Aug. 16	....	31⅛	31¼	75c quar. Aug. 1
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Apr. 8	....	99	100	
Boston Sand and Gravel Co. (common)	Aug. 12	100	73	75	1% qu., 2% ex. Jan. 1
Boston Sand and Gravel Co. (preferred)	Aug. 13	....	....	85	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Aug. 13	....	....	90	2% quar. Jan. 1
Canada Cement Co., Ltd. (common)	Aug. 17	100	163¾	164	1½% qu. July 16
Canada Cement Co., Ltd. (preferred)[11]	Aug. 12	100	123	....	1¾% quar. Aug. 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Aug. 12	....	101	102½	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Aug. 12	100	96	99	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Aug. 15	No par	28½	....	50c July 11
Charles Warner Co. (preferred)	Aug. 15	100	105½	....	1¾% quar. July 28
Cleveland Stone Co. (new stock)	Aug. 17	....	59⅞	60	
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Aug. 12	100	105	....	50c qu. June 15
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Aug. 18	100	97	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Aug. 18	100	94	98	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	Aug. 11	100	100	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[32]	May 24	....	70	....	
Coplay Portland Cement Co. (6% bonds, 1941)[32]	May 24	....	88	....	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Aug. 18	100	99	101	
Dolese and Shepard Co. (crushed stone)[7]	Aug. 17	50	100	102	$1.50 July 1, $1 ex. July 1
Egyptian Portland Cement Co. 7% pfd.[21]	July 30	....	85	90	1¾% quar. July 1
Egyptian Portland Cement Co. (common)[21]	July 30	....	5	7	40c quar. Oct. 1
Fredonia Portland Cement Co. (6½% bonds, 1940)[32]	May 24	....	97	101	
Giant Portland Cement Co. (common)[2]	Aug. 17	50	40	55	
Giant Portland Cement Co. (preferred)[25]	Aug. 17	50	40½	40½	3½% June 15
Ideal Cement Co. (common)	Aug. 17	No par	80	83	$1 quar., July 1
Ideal Cement Co. (preferred)[33]	Aug. 15	100	111½	112½	1¾% quar. July 1
International Cement Corporation (common)	Aug. 17	No par	56⅞	56⅞	$1 quar. June 30
International Cement Corporation (preferred)[2]	Aug. 15	100	105	108	1¾% quar. June 30
Kelley Island Lime and Transport Co.	Aug. 17	100	150	155	$2 quar. July 1
Lawrence Portland Cement Co.[2]	Aug. 17	100	99	103	2% quar.
Lehigh Portland Cement Co.[6]	Aug. 17	50	114	117	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	Aug. 12	100	99½	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	Aug. 12	100	97½	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	Aug. 12	100	100	....	
Marblehead Lime Co. (5½% notes)[14]	Aug. 12	100	98	....	
Michigan Limestone and Chemical Co. (common)[6]	Aug. 17	....	26	28	
Michigan Limestone and Chemical Co. (preferred)[6]	Aug. 17	....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Aug. 17	25	40	41	50c Aug. 1
Monolith Portland Cement Co. (common)[9]	Aug. 12	....	12¼	12⅝	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Aug. 12	....	30¾	31⅞	
Monolith Portland Cement Co. (preferred)[9]	Aug. 12	....	9¼	9⅝	
National Gypsum Co. (common)[35]	Aug. 18	....	54	58	
National Gypsum Co. (preferred)[35]	Aug. 18	....	79	83	
National Gypsum Co. (pref. carrying acc. div.)[35]	Aug. 18	....	81	84	
Nazareth Cement Co.[20]	Aug. 12	No par	31	34	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Aug. 15	....	110	115	
Newaygo Portland Cement Co. (6½% bonds, 1938)[32]	May 24	....	100	102	
New England Lime Co. (Series A, preferred)[14]	Aug. 12	100	....	95	
New England Lime Co. (Series B, preferred)[22]	Aug. 13	100	95	97	
New England Lime Co. (V.T.C.)[22]	Aug. 13	....	33	36	
New England Lime Co. (6s, 1935)[14]	Aug. 12	100	98	100	
New York Trap Rock Corp. (6% bonds, 1946)[32]	Aug. 17	....	100⅜	101	
North American Cement Corp. 6½s 1940 (with warrants)	Aug. 17	100	83	83	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[32]	July 14	....	60	65	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Apr. 9	....	8⅛	9	
North American Cement Corp. (preferred)	Apr. 25	....	....	....	1.75 quar. Aug. 1
North Shore Material Co. (1st Mort. 6's)[15]	Aug. 18	100	99	....	
Pacific Portland Cement Co. (common, new stock)	Aug. 11	....	26	....	
Pacific Portland Cement Co., Consolidated[5]	Aug. 13	100	61	....	25c mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	Aug. 11	100	97	....	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Aug. 15	10	4	4½	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Aug. 17	100	99	99	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	Aug. 15	100	93½	95½	1¾% Sept. 15
Pennsylvania-Dixie Cement Corp. (common)[28]	Aug. 17	....	27	27	80c July 1
Petoskey Portland Cement Co.[1]	Aug. 17	10	11	11½	1½% quar.
Pittsfield Lime and Stone Co.[31]	Apr. 26	....	....	100	
Pittsfield Lime and Stone Co.[31] (common)	Feb. 25	....	....	25	

(CONTINUED ON PAGE 74)

[1]Quotations by Watling,Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York.

Editorial Comment

Building Conditions

The impression gained after reading a number of reports from both governmental and private agencies is that building is more than holding its own, as compared with the record of 1926 to even dates, but that other business activities are somewhat lessening. Exception must be made of the stock market in which very high prices rule at the date on which this is written.

The condition is very plainly shown by one of the analyses of business conditions issued by the Department of Commerce covering the year up to the latter part of July. The index figures for building show a considerable increase above the corresponding figures for 1926, while in other lines the index figures are lower than for the same period. *Projected* work, according to the survey made by *Engineering News-Record*, is about 5% behind last year's total at this time, but the same survey says that there are strong possibilities that the decline will be evened up before the end of the current year. The tendency for agricultural products to rise in price promises increased road programs in farming states.

Plant prices of rock products have shown little change during the past month. In fact there has been little change in the market for building materials, as reported by several authorities. Building labor also remains at about the same level.

Unfair Severance Taxes

A dispute over the collection of a severance tax, or royalty, on sand and gravel, in the states of Oregon and Washington, has some points that make it of much more than local interest. The material taxed is taken from the bed of the Columbia river, which is the boundary between Washington and Oregon where the producers are working. It was claimed by the land commissions of both states that the producers were evading the payment of royalty, and in the discussion which arose the whole question of the reasonableness of the royalty came up. For it is evident that if a severance tax is to be collected at all it should be fair and equitable, that it should not favor one producer more than another and that it should not be too heavy a burden upon the industry. The Oregon and Washington royalty seems to have been unfair, unreasonable and a heavier burden than such an industry should bear.

As reported in Portland, Ore., papers, the producers met with the land commissions of both states. They offered no objection to the principle of imposing a royalty, but they took the ground that 10c a ton, which both states have tried to collect, was too high. It was unfair because it gave an undue advantage to the producer who owned his land. He has a depletion charge to meet, but it is not so high as the royalty charged by the state. The point would seem to be well taken, for if every sand and gravel company had to pay 10c a ton for the material in the bank, a good many of them would be forced out of business, unless they could raise the price correspondingly. It would amount to a tax of 25% or more on the production of some of the larger plants of the country. The commissioners of both states and the producers were endeavoring to reach an agreement that would be fair to everyone when this was written.

The fairness, and also the expediency, of collecting a severance tax is still an open question. But if states are bound to impose it (as at least half-a-dozen have already done) the case now being discussed should be sufficient to show that the tax should be one that is reasonable, and well within the power of the industry to bear.

Overlooking an Opportunity

According to *Industrial Engineering and Chemistry*, power plant operators have a great opportunity in the use of solid carbon dioxide (dry ice) as a refrigerating medium. It points out that the waste gases from power house stacks contain as much as 18% CO_2. If there is an opportunity for power houses in solid carbon dioxide with waste gases of so low a percentage, how much greater would be the opportunity for the lime industry. It is easy, according to Knibbs, to run lime kilns to produce 30% CO_2, and the lime kiln is firmly established as a large scale producer of this gas, having been used for years for the purpose in the sugar industry and other industries.

Apparently an opportunity is being overlooked, but perhaps it is no more the lime manufacturer than the refrigeration engineer who is overlooking it. If solid carbon dioxide is what he needs, he can find his raw material in the waste gases of lime plants which are placed convenient to many of the large centers of population in the United States. And after the lime kilns will come the cement plants which discharge gases with about 50% greater CO_2 content than the gases from power plants will analyze.

Limestone and dolomite quarry owners also have the opportunity to make CO_2 gas as a product with calcium and magnesium salts as byproducts. This may be done by burning the stone under special conditions with coke fuel, or dissolving the stone in acid, which yields practically pure CO_2 without refinement processes.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price bid	Price asked	Dividend Rate
Riverside Portland Cement Co.	May 9	....	165	....	50c monthly, $1.50 ex. Aug. 1
Rockland and Rockport Lime Corp. (1st preferred)[34]	Aug. 12	100	101	....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)[34]	Aug. 12	100	60	....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)[34]	Aug. 12	No par	50	....	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	Aug. 2	100	125	135	$2 qu. July 1
Santa Cruz Portland Cement Co. (bonds)[5]	Aug. 11	....	105½	....	6% annual
Santa Cruz Portland Cement Co. (common)[5]	Aug. 11	....	85	....	$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Aug. 13	....	26	....	
Schumacher Wallboard Corp. (preferred)	Aug. 13	....	25⅛	26	
Southwestern Portland Cement Co. (units)	May 11	....	205	....	
Superior Portland Cement, Inc. (Class A)[20]	Aug. 13	....	47	....	
Superior Portland Cement, Inc. (Class B)[20]	July 28	....	23½	24½	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	July 14	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	July 14	100	98	100	
United States Gypsum Co. (common)	Aug. 17	20	91¼	92	40c quar. Sept. 30
United States Gypsum Co. (preferred)	Aug. 17	100	121¼	122	1¾% quar. Sept. 30
Universal Gypsum Co. (common)[3]	Aug. 18	No par	4½	5¼	
Universal Gypsum V.T.C.[3]	Aug. 18	No par	4	5	
Universal Gypsum Co. (preferred)[3]	Nov. 23	....	73	77	1½% Feb. 15
Universal Gypsum and Lime Co. (1st 6's, 1946)[3]	Aug. 18	100	....	96	
Union Rock Co. (7% serial gold bonds)[18]	Aug. 11	....	99½	101	
Upper Hudson Stone Co. (1st 6's, 1951)[32]	May 24	....	93	....	
Upper Hudson Stone Co. (1st 6's, 1937)[32]	May 24	....	104	....	
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	May 24	100	98½	101	
Whitehall Cement Mfg. Co. (common)[30]	Aug. 12	....	98	....	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	Aug. 18	100	99	....	
Wolverine Portland Cement Co.	Aug. 3	10	6¾	7½	15c quar. Aug. 15
Yosemite Portland Cement Co.	May 11	....	7½	....	

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Asbestos Corp. of Amer. (5 sh. pfd. and 5 sh. com.)[1]	June 22	....	$1 for the lot		
Atlanta Shope Brick and Tile Co.[1]	Nov. 24	....	25c	....	
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29	....	$400 for the lot	....	
Blue Stone Quarry (60 shares)[2]	Mar. 16	....	$10¼ for the lot	....	
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	....	12½	....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	....	70	....	
Eastern Brick Corp. (7% cu. pfd.) (1)	Dec. 9	10	40c	....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	....	
Edison Portland Cement Co. (common)[4]	Sept. 11	50	20c	....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	....	
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Globe Phosphate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22	....	$50 for the lot	....	
Iroquois Sand and Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	....	$12 for the lot	....	
Knickerbocker Lime Co.x	June 22	....	100	....	
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22	....	$60 for the lot	....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	....	....	£1⅛	
Phosphate Mining Co. (1)	Nov. 24	....	1	....	
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1)	June 23	....	$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)[2]	Aug. 31	....	90	....	
Simbroco Stone Co.[2]	Apr. 20	....	12	12	
Southern Phosphate Corp.[6]	Sept. 15	....	1¼	....	
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22	....	$6525 for the lot	....	
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (6)	Nov. 3	....	$1 for the lot	....	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	....	10c	....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Signal Mountain Portland Notes

LANE, ROLOSON & CO., INC., Chicago, Ill., are offering at 100 and interest $600,000 five-year 6% sinking fund gold notes of the Signal Mountain Portland Cement Co., Chattanooga, Tenn. Dated August 1, 1927. Due August 1, 1932. Harris Trust and Savings Bank, Chicago, trustee.

The following data are from a letter of John L. Senior, president of the Signal Mountain Portland Cement Co.:

History. The Signal Mountain Portland Cement Co. was incorporated under the laws of Delaware in 1920, and construction of the first two units of its plant was completed during the latter part of 1923. In 1924 the company produced 832,000 bbl. of finished cement, with an average monthly clinker production for that year of 71,649 bbl. During the year 1925, when a third kiln was installed and the plant account increased over $575,000, the company manufactured and shipped over 1,200,000 bbl. of finished cement. In 1926 additional improvements were made and the company produced over 1,400,000 and shipped over 1,350,000 bbl. of cement. The plant was designed and built under the direction of the Cowham Engineering Co.

Property. The company owns in fee and occupies a tract of land consisting of about 450 acres which contains a high-grade deposit of limestone estimated as sufficient for the company's present rate of operation for over 70 years. The plant is situated on the Dixie Highway, about 5 miles north of Chattanooga, Tenn., where excellent facilities are available, both for the obtaining of raw materials and shipment of finished cement. The limestone quarry and clay deposit are located on company property, adjacent to the mill, offering unusually favorable operating conditions. The company's manufacturing facilities are of the most modern and approved character, including three Allis-Chalmers kilns, 11x175 ft., together with the necessary grinding mills, in both raw and finish departments, thus providing a well-balanced mill for the production of 5000 bbl. per day of cement. Ample storage facilities for crushed stone, clay, coal and gypsum are provided, and with the additional silos recently completed, the company now has storage capacity for 160,000 bbl. of finished cement. Ample electric power for the operation of the plant is furnished under a favorable contract with the Tennessee Electric Power Co. The company now has an annual productive capacity of 1,500,000 bbl. of finished cement, and since the completion of the last unit has been manufacturing and shipping at an annual rate of 1,350,000 bbl. Against a total plant investment to date of approximately $2,325,000, depreciation of over $368,000 has been charged, so that the company's capital investment at this date is at the rate of less than $1.31 per bbl. of annual capacity, which offers an unusually favorable comparison with other modern plants. The company has an exceedingly efficient manufacturing operation and has maintained its bin cost at a consistently low figure, in spite of rising costs of labor and materials.

Sales and Earnings. The company has shown a steady growth, as will be seen from the following table, the 1926 and 1927 figures contained in which have been audited by Arthur Andersen & Co., certified public accountants.

SIGNAL MOUNTAIN PORTLAND CEMENT CO. COMPARATIVE REPORT (1924-1927)

	1924	1925	1926	1st 6 mo. 1927
Net sales	$1,312,784	$1,955,351	$2,178,617	$857,978
Earnings before depreciation, interest and federal taxes	313,844	604,760	616,605	164,994
Depreciation	77,861	101,620	130,529	72,697
Available for interest and federal taxes	235,983	503,140	486,076	92,297

Interest charges on the $600,000 notes now to be outstanding are at the rate of $36,000 per annum. Net earnings of the company available for interest and federal taxes, during the three years and six months above described, were at the average rate of $376,427 per annum, or in excess of ten times such annual interest requirements.

Personnel and Management. Officers of the company at this time are as follows: Walter A. Sadd, Chattanooga, chairman of

board; John L. Senior, Chicago, president and general manager; Francis P. Butler, Chicago, vice president; J. L. Caldwell, Chattanooga, vice president; J. P. Hoskins, Chattanooga, treasurer; R. R. Caskey, Chattanooga, secretary and assistant general manager.

Purpose of Issue. The purpose of the present financing is to fund the company's bank loans and floating indebtedness, incurred principally in plant extension and permanent improvements to its property, and also to increase working capital.

Capitalization (as given below) upon completion of present financing:

	Authorized	Issued
Five-year 6% sinking fund gold notes	$1,000,000	$ 600,000
8% cum. pfd. stock	3,000,000	2,500,000
Com. stock (no par value) shares	30,000	30,000

Provisions of Note Issue. These notes are the direct obligation of the company, and its only funded debt.

Sinking Fund. The trust indenture will provide for a sinking fund at the rate of 3 cents for each barrel of cement produced by the company and shipped, which sinking fund shall be paid quarterly to the trustee and applied to the purchase or redemption of notes of this issue.

SIGNAL MOUNTAIN PORTLAND CEMENT CO. BALANCE SHEET, JUNE 30, 1927

ASSETS

Current Assets:		
Cash	$ 60,158.95	
Accts. and notes rec. —less reserve	217,235.13	
Inventories, incl. finished cement, clinker, sacks and supplies at book value based on cost	473,287.40	
		$ 750,681.48
Investments and other assets		117,369.01
Deferred charges, incl. note disc.		71,491.10
Fixed assets, incl. plant site, clay and quarry lands, bldgs., mchy. and equipm't at cost	$2,326,621.02	
Less reserve for dprn.	368,738.55	
		1,957,882.47
Good will and organization expenses at book value		578,084.49
		$3,475,508.55

LIABILITIES

Current Liabilities:		
Trade and misc. accts. payable	$ 56,562.28	
Accrued salaries and payroll	12,653.07	
Res. for taxes, incl. fed. inc. taxes	43,905.00	
		$ 113,120.35
5-yr. 6% sinking fund gold notes due Aug. 1, 1932—outstanding		600,000.00
Capital Stock and Surplus:		
Pfd. stk., issued and outstanding	$2,500,000.00	
Balance available for 30,000 sh. no par value com. stk. rep. accumulated earnings since organization	262,388.20	
		2,762,388.20
		$3,475,508.55

Note: The company is contingently liable as guarantor of obligations, etc., to the extent of $51,500.

U. S. Gypsum Co. Semi-Annual Report

THE U. S. Gypsum Co. and subsidiaries for the six months ended June 30, last, showed a net income of $3,892,302 after depreciation, depletion, federal taxes and all other charges, equal after estimated preferred dividends to approximately $5.25 a share earned on 687,875 shares of $20 par common stock outstanding as of December 31, 1926. This compares with a net income of $4,130,830, or $7.54 a share on 506,916 common shares, in the corresponding period of last year.

A comparison of the consolidated income account for the six months ended June 30 follows:

	1927	1926
Operating earnings	$5,023,556	$5,189,533
Depreciation and depletion	540,943	433,085
Federal taxes	590,311	625,618
Net income	3,892,302	4,130,830
Dividends paid	828,106	1,201,359
Surplus	3,064,196	2,929,470

Commenting on this report, Sewell L. Avery, president, said: "The statement reflects a decrease in building which in association with recent increases in capacity in the gypsum industry have resulted in severe competition and a general reduction of prices. Indications point to a fair demand for the remainder of the year, but this does not encourage the belief that it will relieve the downward price tendencies which have prevailed during the last quarter. The company's program of plant extension and improvement is nearly complete, and we should soon enjoy all the advantages of these investments."

Canada Gypsum and Alabastine Bonds Offered

ROYAL Securities Corp., Montreal, Canada, are offering at 100 and accrued interest, $1,250,000 6½% first mortgage, 15 year sinking fund gold bonds of the Canada Gypsum and Alabastine, Ltd.

Canada Gypsum and Alabastine, Ltd., has acquired through direct ownership as going concerns the assets and undertakings of the Alabastine Co., Paris, Ltd., and of its wholly owned subsidiaries, the Ontario Gypsum Co., Ltd., and Toronto Builders' Supplies, Ltd., and through ownership of its entire capital stock, control of Nova Scotia Coal and Gypsum Co., Ltd., which business represents a continuous successful record of operation since the organization of the Alabastine Co., Paris, Ltd., in 1886.

The plants at Caledonia, Ont., and Montreal, Que., manufacture gypsum products, which include wall board, partition and roof tiles, while the plants at Paris, Elora and Teeswater manufacture alabastine plaster, lime, etc. The company's principal gypsum mine adjoins the Caledonia mill, while an additional developed mine is owned, with a plant in conjunction, at Lythmore, Ont., and a further gypsum mine is owned at Mabou, N. S., by the Nova Scotia Coal and Gypsum Co. These plants are well situated with relation to the principal manufacturing and consuming centres of Canada.

Fixed assets, including land, buildings, equipment, mines and mine development are estimated at $2,162,336, exclusive of investment in and advances to the Nova Scotia Coal and Gypsum Co.

Based upon annual earnings of properties now being acquired, average annual earnings for the three years ended May 31, 1927, after deduction of operating and maintenance expenses and local taxes and after giving effect to the financing were $223,193 available for bond interest and depreciation, while earnings on the same basis for the year ended May 31, 1927, were $248,846 on first mortgage bonds now being issued, equivalent to over three times annual bond interest requirements.

Proceeds of the issue will be applied, in part, to the funding of capital expenditures during the past few years, which include cost of construction of a modern plant at Montreal, for the manufacture of "Gyproc" wall board and other gypsum products and the purchase of the remaining outstanding shares of the Ontario Gypsum Company, Limited.

In addition to the bonds, of which $1,500,000 are authorized, and $1,250,000 are being issued, the company has authorized 100,000 common shares of no par value, of which 46,994 shares are being issued.

Charles Warner Special Dividend

THE directors of the Charles Warner Co., Wilmington, Del., at a recent meeting declared a special dividend of 50 cents per share on the common stock, payable Aug. 10. This stock is also on a regular $3 annual dividend basis.

Penn-Dixie Semi-Annual Report

THE Pennsylvania-Dixie Cement Corp., New York, including figures of the predecessor and present companies, reports combined profit of $4,343,914 after depreciation and depletion charges, for the 12 months ended June 30, 1927. After provision for interest charges and federal taxes, a balance of $3,094,882 was reported. This, after allowing for the annual 7% preferred dividend requirements, was equal to $5.46 a share earned on the 400,000 no par common shares outstanding. The comparative balance sheet of the company is given below.

PENNSYLVANIA-DIXIE CEMENT CORP. (AND SUBSIDIARIES) COMPARATIVE CONSOLIDATED BALANCE SHEET

Assets—	June 30, '27	Dec. 31, '26	Liabilities—	June 30, '27	Dec. 31, '26
Cash	$ 2,077,416	$ 3,454,999	Notes payable	....	$ 66,821
Notes and accts. receivable	1,626,411	1,054,397	Accounts payable	$ 227,271	156,276
Inventories	3,085,242	2,704,145	Dividends payable	320,000	....
Fixed assets	*26,504,640	26,233,242	Accrued wages, interest, taxes, etc.	364,958	427,340
Miscellaneous investments	119,500	120,500	Reserve for federal taxes	531,116	700,221
Insurance fund	30,000	30,000	Miscellaneous reserves	59,839	67,523
Deferred charges	67,813	79,879	1st mtge. sinking fund 6s	12,443,000	12,468,000
			7% cumulative pfd. stock	13,000,000	13,000,000
			Com. stock, no par value	†4,000,000	4,000,000
Total (each side)	$33,567,022	$33,677,160	Surplus	2,620,838	2,790,979

*After deducting depreciation. †Represented by 400,000 shares of no par value.

Portland Cement Output in July

Production Highest for Any Single Month—Shipments Above Last Year—Stocks Declining but Are Still Large

PRODUCTION of portland cement in July has never been surpassed in any month, according to the Bureau of Mines, Department of Commerce. July shipments of portland cement are well over those of July, 1926, and have been exceeded only by those of June, 1926 and 1927. Stocks of portland cement continue to decline but are nearly 12% higher than on July 31, 1926.

The output of three more new plants, located, respectively, two in New York and one in Iowa, is included in these statistics, which are prepared by the Division of Mineral Statistics of the Bureau of Mines and are compiled from reports for July, 1927, received direct from all manufacturing plants except two, for which estimates are necessary on account of lack of returns.

Clinker Stocks

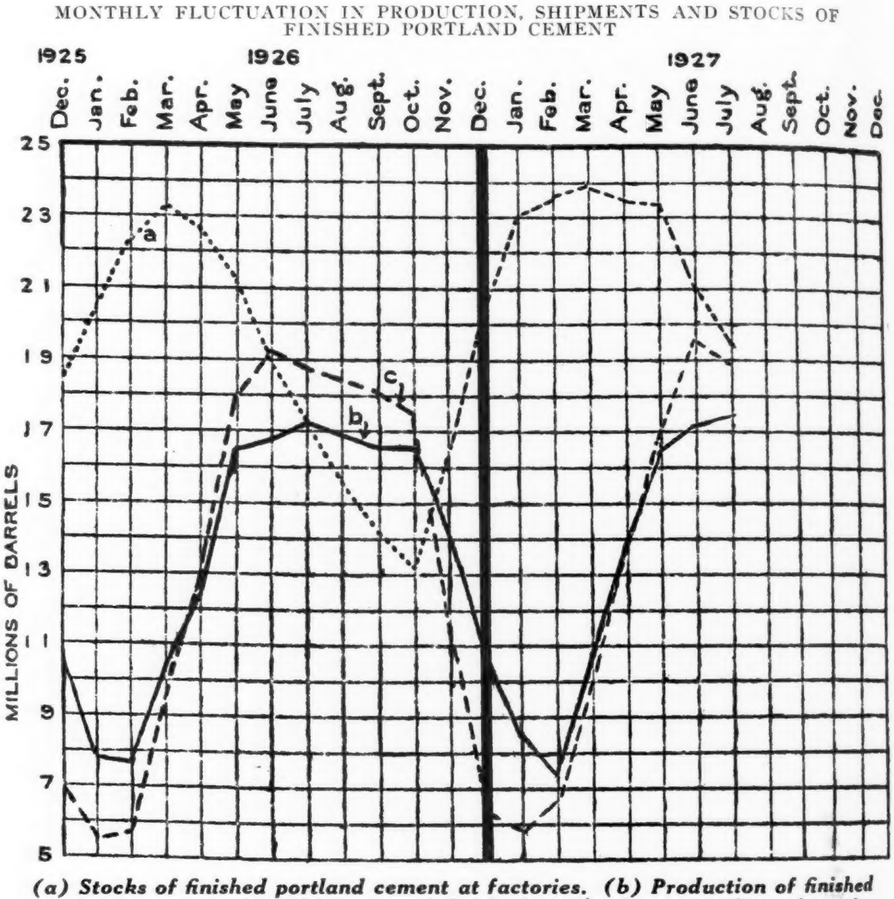
Stocks of clinker, or unground cement, at the mills at the end of July, 1927, amounted to about 9,347,000 bbl. compared with 10,892,000 bbl. (revised) at the beginning of the month.

ESTIMATED CLINKER (UNGROUND CEMENT) AT THE MILLS AT THE END OF EACH MONTH, 1926 AND 1927, IN BARRELS

Month	1926	1927
January	9,074,000	9,989,000
February	10,931,000	11,943,000
March	12,290,000	12,997,000
April	12,967,000	13,335,000
May	11,695,000	12,488,000
June	10,144,000	*10,892,000
July	8,604,000	9,347,000
August	7,362,000	....
September	6,112,000	....
October	5,370,000	....
November	5,748,000	....
December	7,799,000	....

*Revised.

MONTHLY FLUCTUATION IN PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT



(a) Stocks of finished portland cement at factories. (b) Production of finished portland cement. (c) Shipments of finished portland cement from factories

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during the months of May and June, 1926 and 1927:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN MAY AND JUNE, 1926 AND 1927, IN BARRELS*

Shipped to—	1926—May	—1927	1926—June	—1927
Alabama	184,774	164,359	215,892	155,252
Alaska	2,296	2,514	1,130	1,823
Arizona	37,717	46,724	46,262	45,172
Arkansas	64,713	77,207	66,835	77,555
California	1,165,540	1,281,461	1,187,724	1,153,990
Colorado	119,761	109,671	124,451	95,029
Connecticut	209,515	193,315	206,301	255,970
Delaware	38,972	35,564	45,642	32,807
District of Columbia	85,961	79,566	86,218	87,224
Florida	386,712	234,914	297,204	199,406
Georgia	186,398	209,126	174,488	196,027
Hawaii	13,705	25,631	14,360	31,227
Idaho	58,044	26,767	54,424	29,085
Illinois	1,671,317	1,402,964	1,854,806	1,921,502
Indiana	570,942	561,019	†673,087	739,188
Iowa	317,323	357,184	329,422	553,469
Kansas	259,208	294,596	247,335	243,653
Kentucky	188,486	188,319	†181,121	201,477
Louisiana	96,519	116,352	106,338	119,191
Maine	51,441	49,870	66,264	67,820
Maryland	279,126	224,398	244,763	245,061
Massachusetts	362,878	289,218	338,079	320,541
Michigan	1,182,060	1,258,924	†1,439,270	1,504,877
Minnesota	496,800	387,814	526,695	485,312
Mississippi	73,146	74,061	73,345	76,227
Missouri	696,773	409,889	631,184	438,193
Montana	23,832	24,561	23,114	33,243
Nebraska	190,275	155,964	187,780	145,564
Nevada	8,165	7,495	9,895	12,853
New Hampshire	46,559	38,333	48,285	47,672
New Jersey	770,730	894,457	773,450	944,454
New Mexico	12,004	31,149	16,222	21,991
New York	2,223,644	2,188,026	2,475,868	2,839,613
North Carolina	424,474	367,215	420,248	325,413
North Dakota	58,351	40,034	75,470	74,012
Ohio	1,200,619	†966,808	†1,319,226	1,309,273
Oklahoma	229,209	†309,509	219,946	266,615
Oregon	127,318	152,050	150,962	172,173
Pennsylvania	1,614,063	1,331,265	1,697,387	1,719,593
Porto Rico	0	2,250	0	1,750
Rhode Island	96,407	77,876	80,912	68,486
South Carolina	58,544	87,442	47,279	64,616
South Dakota	61,899	38,442	53,091	54,405
Tennessee	201,130	217,416	206,917	219,588
Texas	431,778	545,848	447,231	419,994
Utah	38,301	32,759	66,883	40,344
Vermont	28,202	29,715	32,291	42,594
Virginia	196,368	168,463	211,665	204,817
Washington	212,259	223,574	260,756	295,426
West Virginia	217,546	141,521	†208,797	170,166
Wisconsin	537,441	568,828	691,934	869,960
Wyoming	17,558	17,531	20,331	25,173
Unspecified	70,063	40,626	†80,565	16,544
	17,896,866	16,800,584	†19,059,145	19,633,410
Foreign countries	76,134	58,416	74,855	47,590
Total shipped from cement plants	17,973,000	16,859,000	19,134,000	†19,731,000

*Includees estimated distribution of shipments from three plants in May and June, 1927; from four plants in June, 1926; and from five plants in May, 1926.

†Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1926 AND 1927, IN BARRELS

Month	Production 1926	Production 1927	Shipments 1926	Shipments 1927	Stocks at end of month 1926	Stocks at end of month 1927
January	7,887,000	8,258,000	5,674,000	5,968,000	20,582,000	22,914,000
February	7,731,000	7,377,000	5,820,000	6,731,000	22,385,000	23,560,000
March	10,390,000	11,452,000	9,539,000	11,083,000	23,236,000	23,922,000
First quarter	26,008,000	27,087,000	21,033,000	23,782,000	....	....
April	12,440,000	14,048,000	12,965,000	14,350,000	22,710,000	23,654,000
May	16,510,000	16,674,000	17,973,000	16,859,000	21,255,000	23,482,000
June	16,866,000	*17,167,000	19,134,000	*19,731,000	19,000,000	*20,923,000
Second quarter	45,816,000	47,889,000	50,072,000	50,940,000	....	....
July	17,134,000	17,398,000	18,812,000	18,984,000	17,301,000	19,337,000
August	16,995,000	....	18,583,000	....	15,718,000	....
September	16,571,000	....	18,087,000	....	14,188,000	....
Third quarter	50,700,000	....	55,482,000	....	....	....
October	16,596,000	....	17,486,000	....	13,334,000	....
November	14,193,000	....	11,276,000	....	16,243,000	....
December	10,744,000	....	6,432,000	....	20,616,000	....
Fourth quarter	41,533,000	....	35,194,000	....	....	....
	164,057,000	....	161,781,000	....	....	....

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JULY, 1926 AND 1927, AND STOCKS IN JUNE, 1927, IN BARRELS

Commercial district	Production 1926—July	Production July—1927	Shipments 1926—July	Shipments July—1927	Stocks at end of 1926—July	Stocks at end of July—1927	Stocks at end of June, 1927*
E'n Pa., N. J. & Md.	3,935,000	4,080,000	4,215,000	4,237,000	3,687,000	4,236,000	4,394,000
New York	911,000	1,258,000	1,146,000	1,263,000	992,000	1,482,000	1,487,000
Ohio, W'n Pa., W.Va.	1,851,000	1,909,000	2,053,000	2,056,000	2,109,000	2,806,000	2,953,000
Michigan	1,506,000	1,460,000	1,681,000	1,674,000	1,558,000	1,758,000	1,971,000
Wis., Ill., Ind. & Ky.	2,438,000	2,360,000	3,017,000	2,935,000	2,400,000	1,857,000	2,432,000
Va., Tenn., Ala., Ga. and La.†	1,445,000	1,504,000	1,419,000	1,465,000	1,150,000	1,245,000	1,206,000
E'n Mo., Iowa, Minn. and So. Dak.	1,576,000	1,509,000	1,756,000	1,931,000	2,237,000	2,419,000	2,841,000
W'n Mo., Neb., Kan. and Okla.	1,067,000	964,000	1,160,000	1,035,000	1,362,000	1,671,000	1,743,000
Texas	459,000	458,000	464,000	472,000	472,000	316,000	330,000
Colo., Mont. & Utah	312,000	239,000	269,000	254,000	413,000	526,000	541,000
California	1,302,000	1,264,000	1,276,000	1,241,000	508,000	624,000	601,000
Oregon and Wash.	332,000	393,000	356,000	421,000	413,000	397,000	424,000
	17,134,000	17,398,000	18,812,000	18,984,000	17,301,000	19,337,000	20,923,000

*Revised. †Began producing June, 1927, and shipping July, 1927.

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1926 AND 1927

Month	Exports 1926 Barrels	Exports 1926 Value	Exports 1927 Barrels	Exports 1927 Value	Imports 1926 Barrels	Imports 1926 Value	Imports 1927 Barrels	Imports 1927 Value
January	72,939	$216,431	75,346	$254,072	3,250,056	$5,128,836	....	....
February	73,975	220,706	71,404	233,985	360,580	$576,717	193,175	$269,661
March	69,080	205,647	67,956	240,165	314,118	527,948	130,421	200,680
April	96,296	284,772	72,383	243,832	493,241	812,968	181,145	261,519
May	78,601	224,365	59,332	205,574	257,302	398,114	191,868	313,262
June	80,684	248,814	69,205	237,281	223,130	337,031	178,929	263,618
July	130,822	370,220	....	....	335,570	495,744	129,111	201,682
August	64,946	216,489	....	....	250,862	395,981	....	....
September	70,920	239,174	....	....	350,638	560,532	....	....
October	69,389	225,874	....	....	194,129	308,224	....	....
November	76,598	238,103	....	....	263,403	386,335	....	....
December	89,976	305,238	....	....	55,233	82,949	....	....
					151,850	246,293	....	....
	974,226	$2,995,833	....	....				

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN JUNE, 1927

Imported from	District into which imported	Barrels	Value
Belgium	Florida	19,172	$27,993
	Massachusetts	35,502	59,133
	New Orleans	3	6
	New York	3,000	3,973
	Philadelphia	32,380	46,775
	Porto Rico	3,000	6,468
	Rhode Island	14,703	19,498
	Total	107,760	$163,846
Canada	St. Lawrence	2,750	$10,165
Czechoslovakia	Porto Rico	1,000	$1,483
Denmark	Porto Rico	14,000	$21,348
Germany	Los Angeles	200	$440
	New Orleans	410	419
	Total	610	$859
Norway	Los Angeles	500	$572
	New York	1,748	2,307
	Total	2,248	$2,879
United K'gd'm.	Philadelphia	743	$1,102
	Grand total	129,111	$201,682

Exports and Imports*

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN JUNE, 1927

Exported to—	Barrels	Value
Canada	1,819	$10,169
Central America	13,751	42,178
Cuba	11,245	30,324
Other West Indies and Bermuda	4,333	11,884
Mexico	9,239	27,538
South America	23,508	84,016
Other countries	5,310	31,172
	69,205	$237,281

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN JUNE, 1927*

	Barrels	Value
Alaska	3,364	$10,360
Hawaii	18,178	42,327
Porto Rico	6,761	16,571
	28,303	$69,253

*Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

Portland Cement Specifications Revised by Government

THE United States Government master specifications for portland cement was revised June 10, 1927; copies of the specification now being available at 10 cents each from the Superintendent of Documents. There are several changes in the new test requirements. The seven and 28 day tensile strengths have been changed from 200 and 300 to 225 and 325 lb./in.^{2}, respectively, and the specific gravity test has been eliminated. Miscellaneous minor changes have been made in the methods of chemical analysis, as well as in the molding of the briquets. The pressure exerted during molding must now be maintained between 15 and 20 lb. The conditions of storage have been made more definite. The temperature of the mixing water, moist closet, and water in the storage tank are to be kept at 21 deg. C$\pm$3 deg. A few details of the type of testing machine to be used have also been given.—*Techinal News Bulletin.*

Value of Limestone Lands Allowed as Invested Capital

THE value of limestone lands received by a corporation for shares of its stock may be established by the purchase price paid by the incorporators for land shortly before the corporation was organized, according to a recent decision of the Board of Tax Appeals involving the deposits owned by the Northwestern States Portland Cement Co. near Mason City, Iowa.

The value of such lands exchanged for stock, together with sales of common stock, provides a basis for allocating the selling price of blocks of stock, where the sales purport to be of preferred stock at par with common stock issued as a bonus to purchasers between the respective classes of stock, thereby determining the value of the common stock, it was also held.

Under section 207 of the Act of 1917, the value of such lands as of January 1, 1914, which is determined by reducing the March 1, 1913, value proportionate to the extraction in the interim, was held allowable as invested capital for 1917 to the extent that such value does not exceed the par value of the stock specifically issued therefor.

An accurate estimate of the deposit content of such lands is acceptable for computations of depletion, although it is made several years subsequent to the basic date.

Depreciation was held to be a question of fact, and a readjustment of depreciation, resulting in a reduction of invested capital, may not be based merely on a formula or method of computation.

The board also held that current earnings available for dividends may not be reduced by a tentative tax.

Begin Work on New Florida Rock Plant

CONSTRUCTION work on the Zepherhills rock quarry and plant near Dade City, Fla., began recently, according to the Dade City *Banner*. The quarry is part of the holdings of the Walter J. Dolan Properties, Inc., and the work is in charge of the M. Huber Co. of Chicago.

J. W. Hoover Heads Superior Sand and Gravel Co.

J. W. HOOVER, former Washington state highway engineer, recently assumed charge of the Superior Sand and Gravel Co., Seattle, as president and general manager, with headquarters at Seattle.

The company has pits at Friday Harbor and operates distributing plants in Seattle and other Puget Sound cities. A ready mixed concrete plant is also operated in Seattle. In the reorganization of the company, Norman Hill, employed by the state highway department several years ago, will have charge of distribution in Seattle.—*Tacoma* (Wash.) *News-Tribune.*

New Acoustical Gypsum Plaster

A PLASTER which will absorb 10% to 15% of the sound striking it will remedy the acoustical defects of most of the auditoriums, theaters and churches having such defects. An investigation is in progress at the Bureau of Standards with the object of developing such a plaster.

By adding small amounts of alum or aluminum sulphate and a carbonate ($CaCO_3$, for example) to the calcined gypsum-sand dry mix, it has been found that a plaster may be prepared which possesses the desired characteristic of surface porosity and which may be easily worked and applied. When this plaster is wetted, the alum and carbonate react to form carbon dioxide, CO_2, which is entrapped in the body of the plaster in the form of countless minute bubbles of gas.

When the plaster is applied to a water absorptive backing, such as an ordinary scratch or brown coat of plaster, the excess water in the wet acoustical plaster is partially removed by the absorptive effect of the backing and the water films surrounding the gas bubbles are broken, leaving a large number of communicating small pores throughout the plaster. These small gas bubbles also serve another purpose in increasing the ease of workability of the plaster and thus making it easier to apply.

Experiments have been made with many different types of aggregates in an effort to find the most satisfactory one for use. Among those investigated may be mentioned sand, pumice, raw and calcined diatomaceous earth, cinders, ground cork, asbestos, tufa stone (a volcanic ash), and several others. Of these pumice, calcined diatomaceous earth and tufa stone produced the most satisfactory plasters. A plaster containing 2 parts granulated tufa, graded to pass a No. 14 and be retained on a No. 40 sieve; 1 part sand, graded from sieve No. 10 to sieve No. 30; and 1 part of calcined gypsum, to which was added 2% (by weight) of the calcined gypsum of a mixture of calcium carbonate and potassium alum in molecular proportions, and retarder had approximately the sound-absorbing properties desired. It is possible to increase the percentage sound absorption by increasing the tufa: calcined gypsum ratio, increasing the tufa: sand ratio, or increasing the particle size of the aggregate. Certain details, such as the method of application, condition of backing, etc., are now being considered.—*Technical News Bulletin.*

The Big Question

HERE is a bit of distorted Hamlet, sent in by W. L. Wimmer and published with primary apologies to Bill Shakespeare and secondary apologies to Monsanto Current Events, the St. Louis publication in which it recently appeared:

To cut or not to cut. That is the question.
Whether it is not better in the end
To let the chap who knows not the worth
Have the business at cut-throat prices, or
To take up arms against his competition,
And by opposing cut for cut, end it.
To cut—and by cutting, put the other cutter
Out of business. 'Tis a consummation
Devoutly to be wished. To cut—to slash—
Perchance myself to get it in the neck!
Aye—there's the rub; for when one starts to meet
The other fellow's prices, 'tis like as not
He's up against it good and hard.
To cut and slash is not to end the confusion
And there many evils the trade is pestered with;
Nay, nay; 'tis but the forerunner
Of debt, and mortgage such a course portends.
'Tis well to get the price the goods are worth
And not be bluffed into selling them for what
So-and-So will sell his goods for.
Price cutting doth appeal unseemly
And is fit only for the man who knows not
What his goods are worth, and who, ere long,
By stress of making vain comparison
Betwixt bank account and liabilities,
Will make his exit from the busness.
—Members News Letter of the Associated General Contractors.

First Concrete Highway for Argentina

THE Public Works Department of the Province of Buenos Aires called for bids on a 48-kilometer stretch of reinforced concrete highway to be constructed between Moron, just outside of the city of Buenos Aires, and Lujan, a town on the route to Rosario. The estimated cost of the work, including installation of water works in Moron, is 8,900,000 paper pesos ($3,782,500).

Nine contractors responded to the call for bids, and their tenders were opened on June 22. It is understood that two Argentine contractors made the lowest offers. The award should be made within a reasonably short time, and work on the new road started during the present year.

The highway is the first in Argentina to be built of reinforced concrete and the first hard interurban road to be laid down in the populous Province of Buenos Aires, except the strategic stone road to La Plata and the military road to Campo de Mayo. The Lujan road is the initial experiment with tourist roads leading away from Buenos Aires and its success will be watched with interest by the groups in Argentina who are endeavoring to promote a widespread good-roads movement.—*U. S. Commerce Reports.*

Talc Deposits in Canada

CANADA possesses one of the most important high-grade talc deposits in the world. This deposit, at Madoc, Ont., has been one of the principal sources of supply to the manufacturers of talc in United States and Canada for a number of years. Talc occurs in several forms which renders it useful for a variety of purposes. The white variety is of sufficient purity to be used for toilet preparations. Most of the deposit is owned by the George H. Gillespie Co., which operates a grinding plant at Madoc. The rest of the deposit belongs to the Asbestos Pulp Corp. The total production of ground talc from the Madoc properties in 1925 was 13,679 tons, valued at $174,116. Since the imposition of the Fordney tariff considerable amounts are being shipped to Great Britain, Germany and other countries. Grey talc is used for a filler in paper, in dusting rubber, and for other purposes where white talc is not essential. It is found near Victoria, B. C., near Anderson Lake on the Pacific Great Eastern Railway, B. C., and near Chanmox Station on the C. P. R., B. C. Ground talc has been shipped from the British Columbia properties.

In Quebec the deposits are like those in Vermont. Plans are now under way for the erection of a talc grinding plant at Robertsonville, Que. The massive variety of talc is found at Banff, Alta., near Wabigoon, Ont., and in the eastern townships in Quebec. Soapstone blocks for use in lining roasting furnaces of paper mills using the sulphate process have been produced for several years near Robertsonville, Que.

Cement Industry Greatly Lowers Its Accident Record

Determined War on Mishaps Discloses New Outlook With Certain Success Ahead

By A. J. R. Curtis
Assistant to General Manager, Portland Cement Association

ABOUT ninety-nine out of one hundred people familiar with modern industry premise their ideas concerning workmen's safety with the assumption that accidents must happen. To cut mishaps a few per cent, and possibly to ease the conscience of those concerned, are generally assumed to be the functions of accident prevention work.

Although this misconception was probably as prevalent in the cement industry as anywhere else until quite recently, events in our safety work during the past two or three months have largely disproved previous notions and set up new standards.

To prove or disprove the proposition that most cement mill accidents are unnecessary, the recent June No-Accident Campaign was organized as an attempt to operate the entire industry in America without an accident during the month of June. The results of that great effort were so significant and so clearly defined that they leave no opportunity for misinterpretation. Accidents were not eliminated during the month, for 50 mishaps occurred with loss of time and one which was fatal. But accident frequency was reduced beyond comparison with anything contained in the history of our nine years of successful safety work.

In June, 1927, cement mill and quarry accidents were reduced to 26% of the number recorded against June, 1926, the nearest comparable month. If credit is given for the greater number of plants and men engaged in 1927, the accident frequency of the latter month would be about 20% as great as for June, 1926. The figures prove on their face that from 74% to 80% of the general run of cement mill accidents are unnecessary.

Operating Under Normal Conditions

What may be termed normal operating conditions for June prevailed throughout the industry during the progress of the recent no-accident campaign. There was much in the way of construction work, labor turnover, full speed operations and heavy shipments. Practically the entire range of accident hazards was encountered except those peculiar to cold temperatures. The machanical process was not changed in any way.

"What of the accidents which were not eliminated during June?" may be asked. "May they not prove that even under watchful conditions cement mills may expect to have, on the average, 20% to 26% of the average number reported prior to the June campaign?" No, they do not. Nearly every accident of consequence, including the one in which a workman lost his life, showed disobedience of company rules, wanton disregard for well-known safety codes and principles, and a woeful lack of ordinary common sense. There were no coal dust explosions or other accidents of any importance in which hazards peculiar to and chargeable against the mechanical features of the process figured. Hardly an accident occurred which could not have been prevented by better mill safety organization and more effective education and supervision of workmen.

This point of view has been concurred in by state compensation boards and industrial commissions and by leading safety engineers who have analyzed the results of the drive. While applauding our good record, those who are competent to judge point to the telltale story between the lines of our June report, unmistakable evidence that we are still tolerating many unnecessary mishaps. Therefore we may conclude that even in the face of the most remarkable record for the reduction of accidents reported recently by any large industry, further efforts along proper lines may be expected not only to duplicate the success of June month by month, but to exceed it. This condition must be reached before we may feel that satisfactory results have been obtained.

This is the new attitude of the cement industry toward its accidents. With definite data in hand disproving the necessity for injury to its workmen, executives, superintendents, foremen and workers have turned to the problem with a determination to see it through. Cement mill accidents are on the verge of being outlawed today. They are about to be kicked out of the door. The workman involved in an accident may be pitied but he is under suspicion. The department which suffers an accident loses its prestige and often brings disgrace on its foreman. The superintendent finds it most difficult to explain and justify an accident to the management—with the latter in the present frame of mind.

An accident is naturally abhorrent to anyone who gets hurt. Today it is becoming almost equally so to every man worthy of holding a job in a progressive industry. General application of the Golden Rule toward fellow workers and the employer would wipe out practically all accidents not reachable by the training of individuals in safe habits of thought and work.

The Committee on Accident Prevention and Insurance of the Portland Cement Association which is intrusted by the industry with the task of keeping workmen thinking and working safely has selected three methods:

(1) Dissemination of safety information generally throughout the industry, to all who can read.

(2) Employment of contests to take full advantage of the competitive urge among plants and workmen.

(3) Organization of co-operative drives or campaigns which operate on the principle of a boy rolling a big snowball.

One of the most amazing indications of the effective handling of the accident problem in the industry is found in the recent announcement that 27 cement plants had been successful in operating during the first six months of 1927 with no lost time accident. Only four plants on the American continents have succeeded in running a full year without accident, but it begins to look as though, with the advantage of the new viewpoint and the most persistent attention to safety work ever known among the cement plants, several of the latter may win the coveted Portland Cement Association trophy for a perfect record this year.

The list of plants completing the first six months of 1927 without lost time accident is as follows:

Mills with No-Accident Record

Alpha Portland Cement Co., plants at Ironton, Ohio, and Martins Creek, No. 3, Penn.

Bessemer Cement Corp., Bessemer, Penn.

Canada Cement Co., Ltd., plants at Hull, Que., and Belleville, Ont.

Cowell Portland Cement Co., Cowell, Calif.

Crescent Portland Cement Co., Wampum, Penn.

Diamond Portland Cement Co., Middlebranch, Ohio.

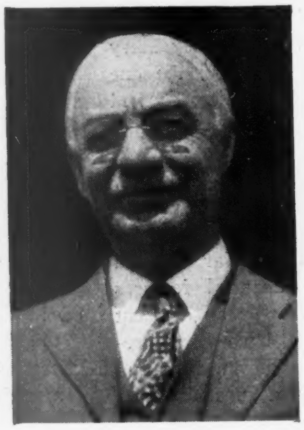
J. B. John

David Adam

D. N. Armstrong

Geo. F. Bayle, Jr.

George F. Coffin

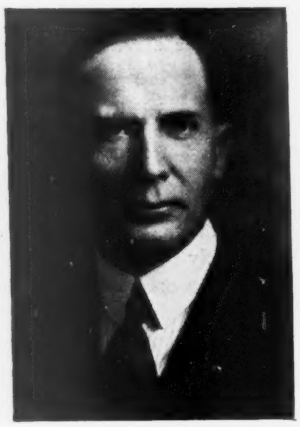


Fred Davis

W. R. Dunn

R. Frame

T. F. Halpin



A. F. Krabbe

William Moeller

R. J. Morse

C. N. Reitze

H. A. Reninger

A. C. Tagge

F. E. Town

Committee on Accident Prevention and Insurance of the Portland Cement Association

Kansas Portland Cement Co., Banner Springs, Kan.

Lehigh Portland Cement Co., plants at Bath, Penn.; Iola, Kan.; Mitchell, Ind. (No. 2); New Castle, Penn., plants No. 1, No. 2 and No. 3; Oglesby, Ill.; Omrod (No. 3), Penn., and Sandts Eddy, Penn.

Louisville Cement Co., Speeds, Ind.

North American Cement Corp., Security, Md.

Pacific Portland Cement Co., Cement, Calif.

San Antonio Portland Cement Co., San Antonio, Texas.

Oregon Portland Cement Co., Lime, Ore.

Texas Portland Cement Co., Dallas, Texas.

Universal Portland Cement Co., plants at Universal, Penn., and Duluth, Minn.

Virginia Portland Cement Co., Norfolk, Va.

Committee on Accident Prevention and Insurance of the Portland Cement Association

J. B. JOHN, CHAIRMAN, vice president and general manager of the Manitowoc and Newaygo portland cement companies, president of the Petoskey Portland Cement Co. and president and general manager, Sandusky Cement Co., Newaygo, Mich. Mr. John has been well known for many years as a successful builder and operator of cement plants. His hobby and particular interest at this time is the subject of mill safety. By long experience and study of the various factors involved in the operation of cement mills and quarries Mr. John has become a firm believer in the idea that practically all of our accidents may be eliminated.

DAVID ADAM, safety engineer, Lawrence Portland Cement Co., Siegfried (Northampton P. O.), Penn. Since Mr. Adam assumed his present duties accidents at the Lawrence plant have been on a steady decline. Mr. Adam's present interest centers in community safety meetings for which his company has been noted. Mr. Adam finds that one way to get workmen to think about safety is to interest the entire family.

D. N. ARMSTRONG, vice president and general manager, Missouri Portland Cement Co., St. Louis, Mo. For several years Mr. Armstrong was chairman of this committee. He was one of the earliest in the industry to point the way toward systematic accident prevention work, and the fine record of the Missouri plant in this regard is largely attributed to Mr. Armstrong's interest.

GEORGE F. BAYLE, JR., second vice president, the Glens Falls Portland Cement Co., Glens Falls, N. Y. Mr. Bayle has contributed much to the work of the committee through his expert knowledge and close connection with insurance problems.

GEORGE F. COFFIN, secretary and treasurer, Nazareth Cement Co., Easton, Penn. Mr. Coffin's interest in accident prevention over a long period has been reflected frequently in Lehigh Valley accident records. Mr. Coffin's particular knowledge and interest in the field of finance places at the disposal of the committee much information on the economic aspects of accident prevention.

FRED DAVIS, plant superintendent, Santa Cruz Portland Cement Co., Davenport, Calif. As superintendent of one of the largest mills on the Pacific coast, employing a large proportion of foreign-speaking labor, Mr. Davis has been working with a unique and difficult problem. The improvement in the safety records of his mill are a result of Mr. Davis' interest and long efforts with foreign-speaking workmen.

W. R. DUNN, works manager, Vulcanite Portland Cement Co., Easton, Penn. Mr. Dunn is one of the oldest and best known cement mill operators in years of service. He has been occupied in his present capacity since 1896 and has been a safety enthusiast and booster during the entire intervening period.

R. FRAME, Alpha Portland Cement Co., Easton, Penn. Mr. Frame, who has under his direction the safety, insurance and personnel work of the Alpha Portland Cement Co., is well known throughout industrial safety circles as the chairman of the Cement Section, National Safety Council, and one of the leading students of safety problems in this country.

T. F. HALPIN, office manager, Marquette Cement Mfg. Co., La Salle, Ill. Mr. Halpin, who is vice chairman of the Cement Section of the National Safety Council, has been in charge of the safety work at the Marquette Cement Manufacturing Co. for a number of years. He is considered an expert on liability insurance and the success of his company as a self-insurer has made his advice along these lines much sought after.

A. F. KRABBE, superintendent, the Olympic Portland Cement Co., Ltd., Bellingham, Wash. Besides having a long and successful record as a cement mill operator, Mr. Krabbe has for many years been a student of safety work and is known as one of its foremost advocates in the Northwest. His own mill is an admirable example of "good housekeeping."

WILLIAM MOELLER, general superintendent, Texas Portland Cement Co., Dallas, Texas. As official in charge of operation and construction at the mills of the International Cement Corp. at Dallas, Ft. Worth, Birmingham and Bonner Springs, Mr. Moeller has accomplished unusual results in safety work. He is a strong advocate of safety contests and always has a new and interesting competitive idea for the use of his mill organizations.

R. J. MORSE, secretary and general manager, Colorado, Nebraska, Oklahoma, Three Forks and Union portland cement companies; vice president, United States Portland Cement Co., Denver, Colo. Mr. Morse is known as the operating genius of the group of western plants under Boettcher management. Although accident hazards are unusually severe in some of these western localities, the perfect June record of this group is a typical illustration of Mr. Morse's interest and ability along these lines.

C. N. REITZE, vice president and general manager, Superior Portland Cement, Inc., Seattle, Wash. Mr. Reitze is a native of Washington state and one of the best known civil engineers on the coast. Until recently he was manager of the coast districts of the Portland Cement Association. He is a shrewd analyst and foe of accidents who gives no quarter.

H. A. RENINGER, special representative, Lehigh Portland Cement Co., Allentown, Penn. Major Reninger is known throughout the industrial field as vice president of the National Safety Council. As an example of his efficient leadership, we may cite the fact that all twenty of the Lehigh mills came through June, 1927, with perfect records. No accident situation can bluff Major Reninger.

A. C. TAGGE, vice president and assistant general manager, Canada Cement Co., Ltd., Montreal, Que., Canada. For several years prior to 1927, Mr. Tagge was chairman of the committee on accident prevention and insurance, and he was the originator of many of the methods which are successfully employed in our accident prevention work. Mr. Tagge takes particular pride in the two association trophies won by the Canada plants in 1925 and 1926.

F. E. TOWN, superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis. When Mr. Town heard there would be a no-accident campaign in June, he climbed to the top of the stockhouse and found that the flagpole was not strong enough to carry the national ensign and the safety flag for an indefinite period. Consequently he erected a new flagpole and the safety flag has been flying ever since.

Superior Portland Erecting Six New Slurry Tanks

THE cement foundations for six new slurry tanks, under construction at the Concrete, Wash., plant of the Superior Portland Cement Co., are being poured and the tank forms are ready to put in place.

Each of the new reinforced concrete tanks will be 38 ft. in dia. and about 30 ft. high, and will have a capacity of 3000 bbl., giving the company an additional capacity for mixing slurry of 18,000 bbl. The company already has in use six tanks of approximately the same size. Greater flexibility of plant operation and better control of the raw mix will result from the new installation.

The tanks were designed and all drawings made by the local engineering staff of the Superior company, and the construction work is under the supervision of Charles Davis. If the present rate of progress is maintained the tanks will be ready for use early in September.—*Concrete* (Wash.) *Herald*.

Foreign Abstracts and Patent Review

Properties and Testing of Sand-Lime Brick. This report by Prof. H. Burchartz, chief of the structural division, State Testing Laboratory, Berlin-Dahlem, Germany, is divided into a discussion of the properties of the brick itself and those of brick joined with mortar. Of the former the unit weight and specific gravity are of greatest importance, as they indicate the density of the brick. The unit weight is determined as the ratio of dry weight to volume. The specific gravity is determined on powdered samples passing the 900- and 5000-mesh per sq. cm. (equivalent to 65- and 175-mesh per linear inch) sieves. The volume of the dried powdered sample is obtained for a certain weight. The ratio of this weight to volume is the specific gravity. The ratio of unit weight to specific gravity expresses the density. Ideal densities approach 1. Tests of apparent density are also made. Samples dried to constant weight are immersed until no further gain in weight is noted. The difference in weight expressed in per cent and multiplied by the unit weight of the sample gives the apparent density. The period of time required for subsequent evaporation is also noted, as it has considerable practical significance.

The average unit weight of German commercial sand-lime brick is 1.78. The specific gravity is 2.55 and the average density is 0.700.

A comparison of the absorptive properties of common (clay) and sand-lime brick shows that sand-lime brick absorb more slowly than clay brick, although evaporation takes place just as quickly.

Resistance to weathering or frost action is the most important property of sand-lime brick. The testing procedure is as follows: About 10 samples of same kind and make are dried to constant weight. They are then exposed to freezing action at —15 deg. C. 25 times, being each time thawed out at room temperature. Sand-lime brick have proven to resist frost action satisfactorily.

Next in importance is the compressive strength of the brick. It is limited by the specifications to not less than 150 kg. per sq. cm. (2130 lb. per sq. in.). However, the prescribed tests do not yield correct values of the actual strength. Standard tests are made on rough cubes obtained by cementing together two halves of a brick. The errors thus introduced depend upon the strength of the cement used, the strength of the mortar cappings and the age of joints and cappings. Tests were made by the author on the effect of the joints on 16 different lots of brick using standard specimens. Uncertain results were obtained. For example, the gain in strength at 28 days varied from 1 to 26% and that at 90 days from 9 to 39%. From this, it is evident that cubes or cylinders should be cut from the brick and tested to obtain true indication of the compressive strength.

Tests carried out at the State Laboratory, Berlin-Dahlem, showed that the compressive strengths of sand-lime brick ranged from 125 to 278 kg. per sq. cm. (1775 to 3950 lb. per sq. in.) and averaged about 180 kg./cm.² (2550 lb. per sq. in.).

The resistance of sand-lime brick to fire has been tested as early as 1900 on walls and houses built for the purpose

The heat conductivity is also of great moment. It is determined indirectly from a series of quantities recorded during the test: the heat W in kg. cal. passing a surface F per hour; the temperatures of the hot and cold body t_1 and t_2 in degrees Centigrade, as well as its thickness d in meters and surface F in sq. m. The heat conductivity is then computed as follows:

$$\Sigma = \frac{W \cdot d}{F \times (t_1 - t_2)} \qquad \frac{\text{in kg. cal.}}{\text{m. hr.} \times \text{deg. C.}}$$

The heat conductivity of a substance depends on its composition and porosity.

Considering further the behavior of sand-lime brick when joined by mortar, the bond between brick and mortar and the strength of the masonry are the determining factors. The bond strength insures good surface coatings. It is tested by cementing together two brick to a cross shaped specimen which is tested in tension at 28 days. The surface of rupture is carefully studied. Rudeloff and Dittmer suggested shear tests for this purpose using specimens in the form of two bricks cemented together along one long side. Using cement mortar, the author obtained a bond strength of sand-lime brick of 62 kg. per sq. cm. (880 lb. per sq. in.), while that of ordinary brick was but 33 kg. per sq. cm. (468 lb. per sq. in.). Tests of the hardening of mortar in walls of sand-lime and ordinary brick were made in 1905 to 1911 at Berlin-Dahlem. After six years the mortar joining the sand-lime brick was in good condition, while the joints in ordinary brick masonry showed spalling off of the mortar to a depth of 1½ cm. (0.6 in.).

The compressive strength of the masonry is tested on built-up specimens. Joined with cement mortar, the masonry yields a strength equal to that of the brick; with lime mortar it is only one-third of the latter. An admixture of cement improves the strength of lime mortar. — *Tonindustrie - Zeitung* (1927), 289-292, 306-309.

Setting of Dihydrates of Calcium Sulphate. The rapid hydration of anhydrite with water and a catalyst is due to the formation of unstable complex hydrates on the surface of the anhydrite which decompose giving $CaSO_4 \cdot 2H_2O$. Fine grinding increases the affinity of the anhydrite for water, and an acid salt as catalyst necessitates less grinding than does a neutral salt. Crystallization plays an important part in setting, and as the hydration increases more crystallization is observable. A cement can be made without burning by grinding natural gypsum with a catalyst (at most 0.3%) so that it passes a 9000/cm.² mesh. The highest strength obtained was 70 kg./cm.² (994 lb./in.²) after 28 days, using 0.3% of sodium hydrogen sulphate as catalyst. Sand can be added to this cement, and it can carry up to 30% of anhydrite. *Zeitschrift für Angewandte Chemie* (1927) **40**, 408-9.

Cement from Phosphate Residue. The slag obtained by fusing a crude phosphate with sand and carbon is tapped off and mixed with calcareous or aluminous materials in proportions suitable to form a cement clinker. *English Patent No.* 263,124.

Tempering Plaster. Plaster of paris is mixed with hot water at 60—100 deg. C. The plaster can be kept for several hours in this condition without affecting its setting properties and when used it will harden rapidly when the temperature falls to 38—43 deg. C. *L. E. Chassevent, English Patent No.* 266,335.

Porous Concrete. Clay or clayey material is calcined at above the sintering temperature and the operation interrupted before the expanded mass begins to shrink. On cooling, the clinker produced is ground and used as an admixture with cement, effervescing means, and water in the production of porous concrete. Preferably, the mixture is calcined at such temperature that the mass is melted, a further supply of gases being developed which remain occluded in the material. The light product obtained on cooling (density of 0.5) has increased heat-insulating properties compared with porous concrete produced in the usual way. *English Patent No.* 262,394.

Barytes in the Rubber Industry. Twenty samples of commercial barytes were submitted to a comprehensive chemical and physical examination. Particle size was investigated by elutriation and sedimentation methods, a simplified form of apparatus being described for the latter. Comparative vulcanization experiments were made with two samples, the vulcanization being examined as to tensile strength, elongation, stress-strain curve, permanent set, specific gravity, hardness and color. The results indicate that, for use in rubber, particle size is the most important feature, the practice of grading barytes according to color bearing no rational relation to the properties desirable for rubber compounding. *India-rubber Journal*, (1927), **73**, 885-89, 926-30, 961-66.

Vertical Lime Kiln. A gas-fired kiln with gas inlets, inclined downwards in order to make the flame reach the center and prevent overburning along the kiln sides. *English Patent No.* 265,654.

Fluorspar Purification. Pulverized fluorspar is heated with an alkali hydroxide under pressure to remove the silica. *French Patent No.* 612,142.

Calcining of Magnesite in Rotary Kilns. Calcination of magnesite takes place in a rotary kiln whose temperature is so controlled that the material nearest the heat source is dead-burned. The remote parts of the kiln become zones in which the magnesite is calcined to various degrees which have requisite properties for which the products are to be used. Means are provided for removal of the magnesia from these zones without admixture of the dead-burned product. *Austrian Patent No.* 104,404.

Cement Products Mixture. Fibrous material, such as sawdust, is impregnated with a dilute solution of calcium chloride and mixed in the proportion of 2½ to 6 parts by weight with one part dry cement, sufficient water being added to give the mortar the desired consistency for making cast stone, cement products, etc. *L. S. van Westrum, English Patent No.* 270,013.

Rotary Kiln Process for Aluminous Cement. A finely ground mixture of bauxite and lime, consisting of about 71% bauxite and 25% slaked lime, is calcined in a rotary kiln for a long period at a temperature below the softening point of the mass. The resulting product is then ground in the usual way to make a quick-hardening aluminous cement. *English Patent No.* 270,496.

Bituminous Concrete. To a mixture of dry cement, lime and mineral aggregate is added a bituminous soap made by saponifying a bitumen-soponifiable oil mixture. *English Patent No.* 269,975.

Polished Surfaces for Cast Stone. A mixture of portland cement, color and water is ground to such fineness that it possesses a glossy, lustrous appearance and is then applied to surfaces by brushing on direct or by pressing a thin layer on the stone by means of sheet metal. *Austrian Patent No.* 104,738.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Artificial Stone. Magnesium oxide to which a suitable filler has been added is mixed with an aqueous acetic acid containing a solution of magnesium chloride and zinc sulphate. The proportions of the solution are substantially 11 parts of $ZnSO_4$ of 2.1 sp. gr. to 800 parts of $MgCl_2$ of 1.8 to 2.4 sp. gr. Sufficient of this solution is added to the MgO to wet it. *Edward Welch, U. S. No.* 1,626,577.

Hydraulic Lime-Zinc Cement. A mixture of limestone, zinc retort ashes and coke or coal dust is calcined at a temperature of 950 to 1000 deg. C., whereby the zinc is volatilized and then burned to zinc oxide and deposited as such on the lime. The calcined product, which contains lime impregnated with zinc oxide, is crushed to produce a hydraulic cement. *Oscar Gerlach, U. S. No.* 1,627,170.

Asbestos-Magnesia Plaster. A composition flooring material is made by mixing vegetable fibrous matter, fibred asbestos and caustic calcined magnesia in proportion of 45, 30 and 25%, respectively, by weight. To this mixture a liquid binder solution of magnesium chloride is added in sufficient quantity to make a plastic mass capable of being spread and molded to the desired shape or form, the mass after hardening being suitable as a surfacing material. *A. J. Slosser, U. S. No.* 1,627,296.

Flooring Composition. An improved composition for floors formed as a mixture substantially in the proportions stated of wood flour, magnesite, white silica, and flake asbestos, saturated with magnesium chloride, and adapted while plastic to be pressed into place. *F. E. Boelkron, U. S. Patent No.* 1,635,982.

Bound-edge Wallboard. A plaster wallboard having a composition body with fibrous cover sheets theron, one of said cover sheets passing about the longitudinal edges of the wallboard to engage the opposite side thereof with the other cover sheet extending about said edges over said first sheet to engage the opposite side and secured at its margins thereto, said margins chamfered to bring the exterior surfaces thereof into the plane of the main body of said first sheet, and the inner cover sheet edge being formed with spaced tongues which extend transversely within the wallboard to support the opposite cover sheets at their edges. *C. W. Utzman (assignor to U. S. Gypsum Co.), U. S. Patent No.* 1,631,108.

Artificial Marble. A composition of matter for forming artificial marble, brick, tiling, or the like comprising a magnesite substance, asbestos, an alum hardening substance, slaked lime, casein, powdered saltpeter, a glue binding material, water and sand to form a pasty mass of a consistency suitable for molding purposes. *H. L. Bates, U. S. Patent No.* 1,629,584.

Lime Building Block. Pulverized lime hydrated is intimately mixed in a pug mill with porous materials such as pumice, blast furnace slag or cellulose materials as peanut shells, corn stalks, wheat or grain chaff, with sufficient water to render the mixture plastic and workable. Where granulated slag is used as a filler, the desirable proportions are 40 to 55 parts of slag to 60 to 55 parts of lime hydrate, all parts being by weight. The lime hydrate should not be less than 55 parts by weight, when slag is the only filler used in the mix.

Care should be taken that the mixture be as intimate as possible. In the event that lime putty is used, this intimate commingling is especially important in order that the hydration-controlling effect of the filler may subsequently be properly exercised. After the mixing in the pug mill is completed, the plastic mass is formed into the desired shaped articles under heavy pressure. For example, it can be extruded through a die into the form of hollow blocks, the machine for this purpose being quite similar to that used in the manufacture of other and usual hollow building block. The precise degree of pressure characterizing the extruding operation necessarily varies somewhat with the composition and consistency of the plastic mixture, the dimensions of the dies, and other conditions, but in all cases it is sufficiently high to satisfy the requirements of the invention.

Unslaked lime (calcium oxide) may replace the calcium hydrate in part in preparing the plastic mixture, but the use of unslaked lime is ordinarily less advantageous in that when it is used, the resulting shaped articles sometimes exhibit a tendency to swell and flake, particularly when the lime is in particles of a size which precludes thorough slaking prior to extrusion. Where it is desired that the building block, hollow tile, or other shaped articles, shall be relatively light, and at the same time structurally strong, a non-resinous cellulosic material, such as comminuted corncobs, for example, can be used in place of the mineral absorbent filler specified in the foregoing concrete example. Corncobs give exceptionally good results in this connection, as do also peanut shells.

The blocks after coming from the extruding press are allowed to set, free access of air to the blocks favoring rapid setting. The time of setting varies somewhat depending upon the composition of the mix, but in no case is artificial heat required to bring about proper set within a reasonable time. *O. V. Roberts, U. S. Patent No.* 1,628,807.

Improved Lime Hydrate. Lime produced in the usual way, by shaft kilns or rotary kilns, is discharged from the kiln, without cooling, to water which may be cold or heated at or near the boiling point. The lime is brought into contact with the water at a temperature from 1000 to 1200 deg. C. The amount of water is in excess of that required to produce a dry hydrate; the preferable water ratio being two parts to one of lime, by weight. The resulting hydrated lime is then dried for shipment. Lime which has been allowed to cool may be reheated to 1000 or 1200 deg. C. and the process carried out as above with identical results regarding improved plasticity. Lower temperatures may be used with dolomite limestones or limes. *W. K. Hunter, U. S. Patent No.* 1,634,424.

British Quarry Managers Meet in Annual Conference

THE annual conference of the British Institution of Quarry Managers was held at Harrowgate, England, June 27 to July 2. It is fully and ably reported in the current issue of the *Quarry Managers Journal*, from which the following account is abstracted. This meeting is of especial interest to American readers, not only because the institution has American members but because on this occasion W. E. Farrell, president of the Easton Car and Construction Co. was present with Mrs. Farrell, and the first function on the program was a small dinner party, given by the directors of the *Quarry Managers Journal*, to welcome American friends.

They are said to order those things better in the British Isles, and certainly a reading of the program leaves no doubt that the social advantages of the occasion are more thoroughly realized than in American conventions. There was, for example, a special program for the ladies which included attendance at the civic reception by the mayor and the formal opening of the exposition by the president of the institution, Sir Henry P. Maybury, a garden party and concert, trip to Knaresboro, the beauty spot of Yorkshire, the trade members' dinner and trips to Fountain Abbey and other beautiful places. A dance was given by the management of the hotel and band concerts filled in the afternoons. And of course the main social events were the annual banquet and the annual ball.

Concerning the state of the industry, Sir Henry Maybury said in opening the conference:

British Quarries Are Prosperous

Speaking generally, I suppose I should be correct in saying that the quarrying industry in its many branches is really flourishing. I shall, of course, be told that whilst we have great outputs, the prices are so cut as to leave no margin of profit for shareholders, and although I might agree that the margins are not as wide as one would like to have them, at the same time it is something, in these hard times, to know that we have a balance, however small, on the right side of the ledger.

Motor transport continues to develop, the number of vehicles upon the roads of the country in the last calendar year having been some 100,000 more than in the previous year; representing something like an increase of 9.76%. With the ever increasing number of vehicles necessarily comes the demand for larger and better roads, and it will take many years of hard work before the highways of the country can be put into such a condition as will enable them to satisfactorily support the vehicles which may reasonably be expected upon them.

The motor bus is ever expanding its area of travel and there are few villages now that are not served by such vehicles, to the benefit of the residents, and, I should suppose, to the pecuniary advantage of the individual or company responsible for providing the transit services. This comparatively new form of transport, now becoming so general, using as it does the third class roads, of necessity means increased demands upon the roadstone industry, and as by far the greater mileage of the roads of the country comes under the category of "third class," there must, in my view, be an ever increasing demand, very widespread, for the best and strongest roadstone which our industry can produce.

Whilst the roadstone side has been, and is reasonably intensively engaged, I am glad to observe that the building stone and slate trades are certainly looking up. It is gratifying to know that, after a long period of acute depression, the home slate producers have again come into their own.

The president mentioned the necessity for prompt delivery of materials, of "backing up good salesmanship with prompt delivery," something that rock products producers everywhere might adopt as a motto. And in closing he paid what was evidently enough a heartfelt tribute to the ability of the institution's secretary, S. McPherson, who is also editor of the *Quarry Managers Journal*.

Membership

At this meeting a new set of rules, which would have been called a constitution and by-laws in an American convention, were adopted. From these one learns that the membership of the institution consists of:

Professional members, who are elected as ordinary members, and who must have been employed in the supervision of labor or in the management or technical control of a quarrying operation for at least six years, except that student members may become ordinary members after four years of service. Ordinary members may be advanced to Fellows by the acceptance of the president and council of a thesis with a distinct contribution to the professional knowledge of the industry.

Associate members who are manufacturers of machinery and supplies, or manufacturers' representatives, make a second class.

Honorary members, who have been of valued service to the industry, whether engaged in it or not, make a third.

Registered students, who are principally young men holding executive positions or apprenticed to a quarry manager with the idea of preparing for a managerial position form a class from which future membership will largely be drawn.

Short Papers Read

The papers read were described as "Ten Minute Lecturettes," and while short they were pithy and served as the basis for some excellent discussion. The first was "Mixed Feed and Gas Fired Lime Kilns," and it was given by Alfred B. Searle, well known as a consultant to the rock products industries and a technical writer. His paper was largely an argument for the use of mixed feed kilns (more often called pot kilns in America) on the ground that they saved about 160 lb. of coal per ton, compared with gas fired kilns. He said that in most cases the lime made was practically as pure as that made in gas fired kilns, as the ash was screened away with the fines.

"Platitudes Relating to an Ideal Road Surface" was a paper read by J. S. Killick, who pointed out the essentials of a good road surface and showed how crushed stone met them better than other materials when mixed with the proper binder. He preferred bitumen to cement as a binder, as he thought that a flexible surface was better adapted to the shocks of traffic.

"The Character of Quartzite for Use in Silica Brick Making," by W. J. Rees, was a discussion of ganister rock. The prototype of such materials is Sheffield ganister, which is still in angular fragments after crushing to 200-mesh. Impurities were not often of so much importance as they were once thought to be; in fact, some impurities gave added mechanical and thermal properties to the brick.

"Standardization," the topic treated by Oswald Bond, showed how successful standardization of quarry rolling stock had been in America and mentioned the work of the National Crushed Stone Association which had been of such great value to the American industry. He explained how this association had sent questionnaires around to get a basis for this work. Mr. Searle seemed to believe that the effect of standardization might be to delay improvements in machinery, and Mr. Bond replied that for this reason both the manufacturer and user of the machinery should have equal representation on a committee.

The author of the paper, "The Future of Tar Macadam" (coated road stone), said that he wrote it to provoke discussion and he was successful, to judge from the report. He said that the manufacture of tar macadam had resolved itself into a struggle to produce cheap material, in which quarry managers had undoubtedly been successful, but the results threatened danger to the industry. The cheap tar macadam was not good enough for modern road conditions and so road makers had been forced to seek some other material to surface main roads.

He advised his hearers that they must use a really reliable binder, and not a cheap tar, and use enough of it to prevent internal movement in the road.

The discussion which followed was mainly of a technical nature, but the members seemed agreed that something must be done to better matters, and a committee on road specifications was appointed to consider the subject and report on it.

The last paper given was on stone sawing and cutting, interesting only to the cut stone quarrymen.

Beside the regular annual banquet mentioned there was a trade members' dinner and a "final binge," a dinner with a menu no less appetizing than those which had preceded it. Toasts were drunk at all these dinners. About 200 members and their wives attended the conference.

Richard Hardy

RICHARD HARDY, chairman of the board of directors of the Pennsylvania-Dixie Cement Corp., died at Roosevelt hospital in New York City on August 14. Heart disease was the cause of his death. He was seriously ill for three of four days and was removed to the hospital, where, after a period of illness that did not seem severe, he collapsed suddenly and death ensued. He was a little over 60 years of age.

Mr. Hardy was one of the best known men in the cement and other rock products industries and one of the most loved. His many friends invariably referred to him as "Dick" Hardy, and those friends included men in almost every walk of life. They were proud to be his friends, for he was one who commanded not only affection but respect and admiration. And the record of his long life of usefulness in business and public affairs shows that he was fully worthy of it.

The record of his early years would hardly lead one to believe that he would finish life as a leader in a great manufacturing industry, for his first activities were in the direction of promoting education. He was born in Tentwater, Mich., and after he had been graduated from the University of Michigan he became a teacher and was superintendent of the public schools of Escabana and Ishpeming, Mich. Although he abandoned educational work as a means of livelihood, his heart was always in it, as was shown by the record of his later years. One of his latest works was organizing and directing the building of the memorial school, erected by the Dixie Portland Cement Co. near its plant in Richard City, Ala. It is not only one of the most beautiful school buildings which has been erected but it is pronounced by educational authorities to be a model educational "plant." It was put up by the Dixie company as a memorial to those of its employes who had served in the great war, and it was his wise judgment that chose a school building as a memorial rather than a meaningless statue or less useful form of construction.

Mr. Hardy was president of the Dixie Portland Cement Co. when the school was erected and it was during his long administration of its affairs that this company grew until it held a foremost position among the cement producers of the south. The original plant was several times rebuilt and added to, as often in fact as this was necessary to bring it to the latest standards, and this work is still going on. He was among the organizers of the Dixie company and was its secretary when it was incorporated in 1907. Later the company was merged with a number of other cement manufacturing companies and he became chairman of the board of directors of the consolidation, and a leader in its affairs.

The late Richard Hardy, chairman of the board of directors of the Pennsylvania-Dixie Portland Cement Corp.

But Mr. Hardy was that fine type of American, of which we are so justly proud, who, while he puts all the necessary effort into the conduct of his business, finds time to be a good citizen, not only to the extent of interesting himself in public affairs but of taking an active part in them. He was always interested in the growth and the conduct of public business in Chattanooga, where he lived, and in 1923 he was elected its mayor, the first Republican to hold the office, and he was as successful in the administration of the affairs of the city as he had been in conducting those of the cement company. During the war he was active in securing Liberty loans and at its conclusion he actively aided in the organization of the American Legion.

After the formation of the Pennsylvania-Dixie consolidation, Mr. Hardy removed to New York, his duties calling him to be in closer touch with the financial center of the country. He lived at Hotel Biltmore with Mrs. Hardy, who was with him at the hospital when he died.

He was long a member of the Portland Cement Association and took a prominent part in its affairs. He served as first vice-president and second vice-president, and for many years he was a member of its board of directors.

Mr. Hardy was one of the leaders of industry who will be greatly missed, and this can be more truly said of him than it has been said of many a man. His life was supremely useful, as a business man and a leader in civic affairs. But there is more to be said, for usefulness is not the only test of a successful life. There must be friendships made and held and the respect, not only of the public, but of one's co-workers. Mr. Hardy had these in the fullest degree.

An Experiment in Cost Reduction

American Lime and Stone Company Makes Unique Settlement with Miners

DECREASING prices and vanishing profits in the lime industry made necessary a readjustment of wages at the mines of the American Lime and Stone Co., Bellefonte, Penn. There was objection and a brief strike on the part of certain employes. The following item is reprinted from the Bellefonte *Democrat* of July 21, with the permission of the company officials, and describes a rather unique settlement. It will be particularly interesting to those who have followed the development of personnel work, and the long cultivation of good will between employer and employe, which has marked the progress and growth of this company and of the allied Charles Warner Co., for a number of years.

The striking employes held several mass meetings which eventually resulted in the employes returning to their work.

Following a conference between lime company officials and representatives of the employes, the lime company issued the following statement:

"On Wednesday afternoon, July 20, representatives of the mine employes met with the management of the American Lime and Stone Co.

"The differences can be briefly stated in that the mine employes wanted to retain their wage scale, whereas the management sought to find ways of reducing costs which have been gradually increasing in the mine in the face of considerable reductions in sales prices.

"As no definite agreement could be reached, the management suggested that the mine employes return to work immediately at the readjusted scale, and that the wage scale be submitted to an arbitration committee consisting of three men not interested in any way in the American Lime and Stone Co. One to be appointed by the management, one by the mine employes, and the third to be chosen by the two men appointed. This proposal the committee took back to the main body of employes, together with confidential cost figures given them by the management. The American company agreed to set aside the difference between the readjusted scale and the previous scale in a trust fund pending the decision of the arbitration board.

"The mine employes, however, refused to consider submitting the differences to an arbitration board and as it was the apparent feeling of the mine employes that by cooperative effort the cost of stone per ton could be reduced by an amount equivalent to the reduction in wage scale, the management agreed to continue the former wage scale in the mine, with the understanding that the men involved appoint a committee to work with the management in a co-operative effort to reduce the cost of stone an equivalent amount by October 1, 1927."

Washington Silica Company Installing Equipment

UNDER the direction of W. W. Evans, superintendent of the Washington Silica Co., work of installing a boiler, pump, rotary drier with a capacity of 20 tons daily, screens and other apparatus necessary, has been going on at the company's pit on the Fred Brooks place in Green river valley, near Auburn, Wash. A big oil tank has been installed and boilers and the driers will be fired by crude oil. Mr. Evans expects to start operation soon.

The deposit of sand found on this place is said to be suitable for stucco and interior plaster work. It also contains some glass sand and steel molding sand.

There is also a good grade of talc in the deposit and the company will install settling basins to catch this mineral as the sand is washed.—*Auburn* (Wash.) *Globe-Republican.*

Portland, Ore., Gravel Producers Protest High Royalties

JOHN F. LOGAN, representing several sand and gravel companies of Portland, Ore., which are engaged in a controversy over Columbia river sand royalties, went before a joint conference of state officials at Salem, August 11, in an effort to effect a settlement for his clients. The conference was attended by the state land board of Oregon, State Land Commissioner C. V. Savidge of the state of Washington, and M. M. Wight, assistant attorney general for Washington, and representatives of the gravel companies concerned. The discussion centered about how much these companies shall pay as royalty for sand taken from the Columbia.

The companies, through their attorney, offered a flat sum of $1,000 in lieu of any royalties that might be due on the sand taken from the Columbia river during the last six years, as it was in 1920 that Oregon began to exact a tax of 10c on every cubic yard of sand and gravel taken from stream beds within the state.

Fred Buchtel, Portland statistician, appeared with the statement, in contrast to the attorney's offer, that the accumulation from this 10c per cu. yd. of royalty in the six years since the law was passed would total $81,439, assuming that one-half the sand taken from the Columbia in that time came from the Oregon side.

Representatives of the companies operating in the Columbia river stated frankly that any attempt to collect a material royalty for past gravel operations would seriously embarrass the firms concerned, and that the insistence upon the payment of any considerable royalty upon future operations would put the companies out of business entirely.

Attorney Logan pointed out that in his opinion the responsibility for collection of royalties rested entirely upon the state, since the companies now involved had been operating openly all these years without being challenged. "We have not profited, however, ourselves, by this failure of the state to collect the royalty," Mr. Logan stated, "but the users of our product have profited by the reduced price we were able to offer because this royalty had not been demanded."

The land board took the matter under consideration and will report in a few days.

Companies which Attorney Logan represented at the hearing include Diamond O Navigation Co., Hackett Digger Co., James A. C. Tait Co., Columbia Contracting Co., Portland Gravel Co., Nickum & Kelley Sand and Gravel Co., Star Sand and Gravel Co., and the Columbia Digger Co.

Company Leases River Front

THE Moline Consumers Co. operating sand and gravel plant at Moline and Ottawa, Ill., was recently granted a lease on city land on the river front south of the foot of Broadway, Quincy, Ill., for a term of 20 years at an annual rental of $150 payable in advance from August 1, 1927. The company agreed to erect a sea wall and bins for its stocks, the material, sand and gravel, to be shipped from LaGrange. There are 72,865 sq. ft. of land in the property leased and in addition to the bins, there will be office and other buildings built on the ground.—*Quincy* (Ill.) *Whig-Journal.*

W. M. Myers Joins U. S. Gypsum Co.

W. M. MYERS has resigned his position of associate mineral technologist, U. S. Bureau of Mines, to join the research staff of the United States Gypsum Co. at New York City. His new work for a time will be on gypsum for use in the cement industry.

Mr. Myers is well known to ROCK PRODUCTS readers through his bulletins, many of which have been published in abstract or complete in this journal.

North Carolina Asbestos Plant

A RECENT announcement by the North Carolina department of conservation and development states that the National Asbestos Co. is to erect a new plant at Minneapolis, N. C. The plant is to have a daily capacity of 30 tons and will use raw materials from deposits about three miles from its location.—*Lenoir* (N. C.) *News.*

Richard E. Richart

RICHARD EDGAR RICHART, 42, chief chemist at the Atlas Portland Cement Co.'s plant at Ilasco, Mo., died on August 3 in Mayo Brothers hospital, Rochester, Minn., where he had recently gone for treatment. Mr. Richart had not been in good health for several weeks, but was active at the cement plant until just before his death.

Mr. Richart was born in Audrain county in 1884, but when quite young removed with his family to Florida, Mo., where the family has been prominent for years. His father, J. O. Richart, died a number of years ago, and his mother, who was a sister of the late Dr. Thomas C. Chowning of Hannibal, Mo., passed away in 1925. Surviving him are two sisters, Mrs. D. P. Violette and Miss Ruth Richart, both of whom live at Florida, and D. Paul Richart, division engineer of material for the Missouri State Highway Commission.

Mr. Richart made his home with Dr. and Mrs. Chowning while he attended Hannibal high school. On October 5, 1905, he became connected with the Atlas plant, starting in the laboratory, and was with the company continuously until his death. He was steadily advanced and on July 1, 1925, was made chief chemist. He was one of the company's most successful and efficient men, and was held in high esteem by those with whom he was associated in his work, as well as by his wide circle of friends in northeast Missouri. Mr. Richart was affiliated with Hannibal Lodge, No. 1198, B. P. O. E. He was a Mason, being a past master of Hannibal Lodge, No. 188, A. F. and A. M. He was also a member of Hannibal Chapter, No. 7, Royal Arch Masons; Excalibar Commandery, No. 5, Knights Templar; Moolah Temple, A. A. O. N. M. S. of St. Louis, and Centralia Council, No. 7.

Mississippi Gravel Plant Increases Output

THE Columbus Gravel Co. of Columbus, Miss., is reported to have recently purchased a large gravel tract of which it will develop 570 acres.

The company is one of the older producers of the state and has a present output of 40 cars a day. This output will be increased to 125 tons per day.

New Michigan Gravel Plant Begins Operations

THE Benzieco Gravel Co. began production at its pit and plant near Beulah, Mich., in July. It is a steam shovel operation and the bank material is washed, and the oversize crushed, in a plant of modern design, according to the *Beulah Record.*

Present production of the plant is reported at 1200 yd. per day. The output is being sold to the Wabash railway, largely as washed gravel ballast.

Sand and Gravel Convention Exhibitors to Meet

MACHINERY firms and others who intend to exhibit at the next annual convention of the National Sand and Gravel Association are being notified that a meeting of intending exhibitors will be held September 21. The purpose is to consider plans for the exhibit. The meeting will be held at the Book-Cadillac hotel, in which the convention will be held next January.

Charles H. Ray, chairman of Sand and Gravel Convention Committee

The choice of Detroit for the annual convention is being well received by the members of the Sand and Gravel Association. The convention committee, of which Charles H. Ray, of the Ray Sand and Gravel Co., Detroit, is chairman, is making extensive preparations to insure that the convention will surpass even the very successful conventions of the past few years.

The dates for the convention were carefully chosen after full discussion, and it is believed they will suit the plans of those who wish to take a winter vacation and also those who wish to attend other conventions better than any others which might have been chosen.

Detroit is one of the most energetic and interesting cities in the country and the Book-Cadillac hotel is among the country's finest hotels. It is situated in the heard of the city close to the shopping district and the theaters. It is known that an unusual number of ladies will attend the convention this year, and this situation will commend itself to them.

All sand and gravel producers whether members of the association or not are invited to attend. Information regarding the convention may be had from V. P. Ahearn, secretary, National Sand and Gravel Association, Munsy building, Washington, D. C.

Surety Bond Covers Freight Prepayments

A DECISION that will be of importance to almost all producers of rock products was read by Circuit Judge Parker in an appeal from the federal district court of Northern West Virginia. The Ohio River Gravel Co. sued the Maryland Casualty Co. for $14,098.19 and $13,209.74 on two claims for gravel furnished contractors for highway work which had to be completed by the surety company. The surety company objected to the payment of $6,683.50 on one claim and $6,111.90 on the other, because these amounts represented prepayments of freight (which had to be made because the shipments went to a prepay station). This prepayment was covered in a written contract for the sale of the gravel on one job, but it was not so covered on the other.

The court held there was no doubt that the claimant could recover in the case where the contract covered the freight prepayment, and held that, in equity, it should recover in the other case, since the same contract was implied, and equity regards substance and not form. The payment of freight was not a loan to the contractor but part of a sale upon agreement to pay for the material furnished a certain amount in addition to the freight which the claimant was to advance. The freight therefore became a part of the purchase price and is recoverable (from the surety company) as such. The broad principles on which the decision rests are, in the language of the court:

"One who furnishes material for a public work such as this is allowed recovery on the bond required in lieu of lien on the theory that to the extent of the value of the material which he furnishes he adds to the value of the completed work or structure.

"In this case claimant has in effect furnished material necessary to the building of the roads, not at the point of shipment, but at the place of use. It had a value there greater by the amount of the freight paid than its value at the point of shipment.

"In such case, to hold that claimant can recover only the value at the point of shipment, when he has in effect furnished the material at the place of use by paying the freight charges and having it transported there, would, in our opinion, be both unjust and absurd. The general holding is that in such cases recovery may be had for the expense of transportation."

Plans Large Crushing Plant

JOHN W. KARCH of Celina, Ohio, is reported to have purchased the Cummings farm near Montpelier, Ind., and will start developments of the limestone deposits on the property. A modern crushing plant to cost about $200,000 with equipment will be built, the report states, to produce stone for road and concrete work. The new owner operates other crushing plants in Ohio.—*Montpelier* (Ind.) *Herald.*

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended July 16	July 23	Sand, Gravel and Stone Week ended July 16	July 23
Eastern	4,150	4,191	17,097	17,008
Allegheny	3,783	3,670	12,019	11,845
Pocahontas	884	712	1,473	1,395
Southern	671	702	14,314	14,383
Northwestern	1,550	1,431	11,007	10,526
Central Western	556	602	12,348	12,437
Southwestern	299	305	7,129	7,359
Total	11,893	11,613	75,387	74,953

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

	Limestone Flux 1926 Period to Date July 24	1927 Period to Date July 23	Sand, Gravel and Stone 1926 Period to Date July 24	1927 Period to Date July 23
Eastern	92,491	93,304	232,766	244,654
Allegheny	108,782	102,648	183,408	204,573
Pocahontas	13,712	13,580	23,322	23,804
Southern	19,613	16,228	341,055	341,973
Northwestern	38,862	39,487	157,665	177,465
Central Western	13,931	14,616	245,530	250,475
Southwestern	7,966	9,035	145,313	154,894
Total	295,357	288,898	1,329,059	1,397,928

Comparative Total Loadings 1926 and 1927

	1926	***1927***
Limestone flux	***295,357***	***288,898***
Sand, stone, gravel	***1,329,059***	***1,397,928***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning August 14:

CENTRAL FREIGHT ASSOCIATION DOCKET

16213. To establish a rate of 100c per net ton on **sand**, all kinds, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, Fairview and Swanville, Penn., to Cleveland, Ohio; when loaded in box cars, rate to be 115% higher. Present rate, 65c per net ton on all kinds of sand except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam molding or silica, on which the present rate is 90c per net ton.

16215. To establish on **gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica), carloads, Winona Lake, Ind., to Decatur and Portland, Ind., rates of 80c and 95c per net ton, respectively. Present rates, 88c and 101c per net ton, respectively.

16216. To establish on **stone**, broken, **crushed**, screenings (including crushed limestone and limestone screenings), carloads, Hillsville and Walford, Penn., to Alicia, Penn., rate of 160c per 2000 lb. Present rate, 175c per net ton.

16217. To established on **crushed stone**, in bulk, in open top cars, carloads, Greencastle, Ind., to Centrepoint and Friendswood, Ind., rates of 65c and 80c per net ton, respectively. Present rates, 75c and 90c per net ton, respectively.

16227. To establish on **sand and gravel**, all kinds, carloads, Sciotoville, Ohio, to N. & W. Ry. stations west of Portsmouth, Ohio, on the Cincinnati Division and north of Portsmouth, Ohio, on the Scioto Valley Division, the same rates as concurrently in effect from Portsmouth, Ohio. Rates, both present and proposed, to representative destinations are as follows: Ratès in cents per ton of 2000 lb., from Portsmouth, Ohio, to following Ohio points:

	Pres.		Pres.
Chillicothe	70	Columbus	80
Circleville	80	Hillsboro	100

From Sciotoville, Ohio, to following Ohio points:

	Pres.	Prop.		Pres.	Prop.
Chillicothe	90	70	Columbus	120	80
Circleville	100	80	Hillsboro	110	110

16231. To establish on **sand and gravel**, carloads, from the siding of the Buck Hill Washed Sand and Gravel Co., west of Canton, Ohio:

To—	*Prop. Rate	Pres. Rate
Medina, Ohio	80	12
Spencer, Ohio	80	13½
Elyria, Ohio	90	13½

Present rates, 6th class.
*Rate in cents per ton of 2000 lb.

16234. To establish on **crushed stone**, carloads, East Liberty, Ohio, to New Hampshire and Waynesfield, Ohio, rate of 90c per net ton. Present rates, 6th class.

16235. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Elkhart, Ind., to Cook, Ind., rate of 85c per net ton. Present rate, 16c.

16236. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), carloads, from Willow Creek, Ind., to Lemont, Ill., rate of 88c per net ton, via Wabash, Chicago, and C. & A. R. R. Present rate, 240c per net ton.

16248. To establish a rate of 90c per net ton on **sand and gravel**, carloads, from Lafayette, Ind., to Knox, Ind. Present rate, 113c per net ton.

16250. To establish on **sand and gravel**, carloads, from Wapakoneta, O., to Lima, Cairo and Ottawa, O., rates of 50c, 60c and 70c per net ton, respectively. Present rates: To Lima and Cairo, O., 70c and to Ottawa, O., 80c per net ton. B. & O. R. R. Tariff H-3336-H Ohio No. WL-2957.

16259. To establish on **sand and gravel**, carloads, from Sargents, O., to Austin, O., rate of 85c per net ton. Present rate, 6th class, viz., 13½c per 100 lb.

16266. To establish on **crushed stone**, in open cars, carloads, Marble Cliff, O., to various points in Virginia and West Virginia, rates as shown in Exhibit "A" attached. Present, classification basis.

EXHIBIT "A"

Proposed adjustment—Stone, crushed, from Marble Cliff, O. (in cents per net ton):

To Main Line stations in W. Va.:

Neal	210	Glenhayes	220
Prichard	220	Grum	220
Fort Gay	220	Naugatuck	220

To Twelve Pole Line stations in W. Va.:

Ceredo	210	Wilsondale	220
Lavelette	220	Dingess	230
Wayne	220	Canterbury	230
East Lynn	220	Lenore	230
Coleman	220	Delbarton	230
Dunlow	220		

To Main Line stations in W. Va.:

Chattaroy	230	Davy	270
Williamson	230	Welch	270
Matewan	230	Vivian	280
Delorme	230	Elkhorn	280
Devon	260	Maybeury	280
Wharncliffe	260	Coaldale	280
Hull	260	Bluefield	280
Willmore	270	*Bluefield	280

*Va.

To B. S. & C. stations:

*Lower Elk	260	†Matney	260
*Upper Elk	260	†Grundy	270
†Blackey	260		

*Ky. †Va.

To Dry Fork Branch stations in W. Va.:

Bradshaw	270	Berwind	270
English	270	Conebrake	270

To Tug Ford Branch stations in W. Va.:

Havaco	270	Pageton	280
Gary	280	Leckie	280

To Clinch Valley Extension stations in Va:

St. Clair	290	Drill	290
Tip Top	290	Carbo	290
Burks Garden	290	St. Paul	290
Tazewell	290	Coeburn	290
Cedar Bluff	280	Toms Creek	310
Richlands	280	Norton	310
Swords Creek	280		

16267. To establish on **agricultural limestone**, carloads, Greencastle, Ind., to stations in Illinois on the C. & E. I. Ry. following rates per net ton:

To—	Pres.	Prop.	To—	Pres.	Prop.
Bryce	$1.33	$1.10	Cadwell	$1.33	$1.15
Hustle	1.33	1.10	Duvall	1.53	1.20
Watseka	1.33	1.10	Dollville	1.53	1.25
Reilly	1.33	1.10	Salem	1.53	1.40
Tipton	1.33	1.10			

16268. To establish on **agricultural limestone, in bulk, in open cars, carloads**, Piqua, O., to various points in Indiana, following rates (in cents per net ton):

To—	Prop.	Pres.			
Logansport	115	200	Portland	85	160
Converse	105	180	Decatur	100	170
Marion	100	127	Ft. Wayne	105	190
Hartford City	95	115	La Otto	115	200
Red Key	85	104	Cambridge City	90	104
Ridgeville	80	104	Dunreith	100	115
Union City	75	85	Knightstown	100	115

C. C. C. & St. L. Ry.:

To—	Prop.	Pres.			
Indianapolis	115	127	Rushville	100	170
Elwood	115	150	Shelbyville	105	190
Anderson	105	127	No. Vernon	125	220
New Castle	95	127	Madison	145	230
Hagerstown	90	127	Columbia City	115	200
Columbus	125	200	Plymouth	135	207
Seymour	125	220	Muncie	100	160

16275. To establish rate of 85c per net ton on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Allison Branch, Ill., and Vincennes, Ind., to Mitchell, Ind. Present rate, 90c per net ton.

16276. To establish on **crushed stone**, in bulk, in open cars, carloads, Greencastle, Ind., to Shelbyville, Ind., rate of 88c per net ton. Present rate, 101c per net ton.

16277. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Hugo, O., to Willoughby, O., rate of 85c per net ton. Present rate, 90c per net ton.

16284. To establish on **crushed stone**, carloads, Mitchell, Ind., to Carlyle, Ferrin, Huey and Shattuc, Ill., rate of 113c per net ton. Present rate, 173c per net ton.

16285. To establish on **crushed** stone, carloads, Monon, Ind., to certain destinations in northern Indiana and southwestern Michigan rates as shown in Exhibit "A" attached. Present rates, as shown in Exhibit "A" attached.

EXHIBIT "A"
(Rates in cents per net ton)

Monon, Ind., to—	Pres.	Prop.	Miles
Atwood, Ind.	123	120	78
Auburn Junction, Ind.	138	125	116
Auburn Junction, Ind.	......	*120	....
Albion, Mich.	161	140	174
Arcola, Ind.	138	125	116
Ashley-Hudson, Ind.	138	125	131
Augusta, Mich.	161	125	158
Avilla, Ind.	138	120	114
Bangor, Mich.	138	135	124
Battle Creek, Mich.	161	125	149

Monon, Ind., to—	Pres.	Prop.	Miles
Benton, Ind.	138	120	94
Bourbon, Ind.	123	120	70
Bravo, Mich.	142	135	139
Breedsville, Ind.	138	135	127
Butler, Ind.	138	125	127
Butler, Ind.	......	*120	......
Cassopolis, Mich.	138	120	95
Chamberlain, Mich.	138	120	113
Charlotte, Mich.	161	140	175
Coesse, Ind.	138	125	110
Coloma, Mich.	132	120	109
Colon, Mich.	161	140	131
Columbia City, Ind.	123	120	90
Dowagiac, Mich.	138	120	97
East Saugatuck, Mich.	147	135	152
Eddy, Ind.	138	120	111
Edwardsburg, Mich.	138	120	86
Etna Green, Ind.	123	120	74
Fairfax, Mich.	141	140	130
Fennville, Mich.	142	135	144
Findley, Mich.	161	140	125
Fort Wayne, Ind.	138	125	106
Grand Junction, Mich.	138	135	131
Grand Rapids, Mich.	161	135	185
Granville, Mich.	161	135	179
Hamilton, Ind.	138	125	139
Hartford, Mich.	138	120	116
Hastings, Mich.	161	161	164
Helmer, Ind.	138	125	126
Holland, Mich.	142	135	160
Homer, Mich.	161	140	176
Hudsonville, Mich.	161	135	161
Inwood, Ind.	123	120	66
Jackson, Mich.	161	140	187
Jenison, Mich.	161	135	178
Kalamazoo, Mich.	138	120	133
Kealey, Ind.	138	120	134
Kendallville, Ind.	138	120	125
Lansing, Mich.	161	140	193
La Otto, Ind.	138	120	108
Larwill, Ind.	123	120	98
Lawton, Mich.	138	120	115
Lee, Mich.	142	135	135
McDonald, Mich.	138	135	131
Marcellus, Mich.	138	120	108
Marshall, Mich.	161	140	162
Milford Junction, Ind.	127	125	100
Millersburg, Ind.	138	120	98
New Haven, Ind.	138	125	113
New Paris, Ind.	132	125	91
New Paris, Ind.	......	†120	......
New Richmond, Mich.	147	135	149
North Lansing, Mich.	161	140	194
Pavilion, Mich.	138	120	129
Pearle, Mich.	142	135	141
Penn, Mich.	138	120	100
Pierceton, Ind.	123	120	102
Pomeroy, Mich.	138	120	132
Pullman, Mich.	142	135	137
Riverside, Mich.	126	120	105
St. Joe, Ind.	138	125	125
Schoolcraft, Mich.	138	120	119
South Milford, Ind.	138	125	120
Three Rivers, Mich.	138	120	116
Topeka, Ind.	138	120	106
Union City, Mich.	161	140	144
Veneklasen, Mich.	161	135	163
Vicksburg, Mich.	138	120	125
Vriesland, Mich.	161	135	169
Wakarusa, Ind.	132	120	81
Wakelee, Mich.	138	120	104
Warsaw, Ind.	123	125	85
Warsaw, Ind.	......	*120	......
Wasepi, Mich.	138	120	125
Waterloo, Ind.	138	125	122
Waverly, Mich.	161	135	160
Watervliet, Mich.	132	120	111
Winona Lake, Ind.	123	120	107
Wolcottville, Ind.	138	120	115
Wyatt, Ind.	127	120	73

*When in connection with Penna.
†When in connection with Wabash.

16294. To establish on **sand and gravel**, carloads, to Middlefield, O., from siding of the East Liverpool Sand Co., east of Leetonia, O., rate of 100c and from East Liverpool, O., 105c per ton of 2000 lb. Present rates, 110c and 140c per ton of 2000 lb. respectively. Route—Via P. R. R., Youngstown, O., and B. & O. R. R.

16299. To establish on **limestone, agricultural**, ground or pulverized; limestone screenings; marl, agricultural (ground or natural marl); shale, natural, loaded in box cars, carloads, Chicago, Ill., to C. F. A. territory, rating of 60% of sixth class. Present—Specific rates based approximately 80% of sixth class; where no specific rates, sixth class.

16305. To establish on **stone, crushed**, in bulk, in open top cars, carloads, Gibsonburg and Woodville, O., to points in Ohio, following rates (present and proposed rates in cents per 2000 lb.):

To—	Pres.	Prop.	To—	Pres.	Prop.
Carrollton	370	135	Sherrodsville	370	135
Granville	340	125	Thurston	340	135
New Concord	390	150			

TRUNK LINE ASSOCIATION DOCKET

15886. Sand, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Morrisville and Tullytown, Penn., to Farnhurst, Del., \$1.15 per ton of 2,000 lb. Reason—To establish rate which will be comparable with those in force on like commodities from and to points in the same general territory per G. O. I. C. C. 14628.

15894. **Crushed stone** and/or screenings, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Water Street, Goodman, Blair Limestone No. 4, Carlim, Calcite, Wertz, Canoe Creek Stone Co., Frankstown, Barree, Union Furnace, Tyrone Forge and Stover, Penn., to Trout Run, Penn., \$1.50, and Grove, Penn., \$1.65 per ton of 2000 lb. Reason—To establish rates which will be comparable with those in force on like commodities between points in the same general territory, as per P. R. R. Tariff, G. O.-I. C. C. No. 14487.

15909. **Crushed stone**, carloads, from Bethlehem, Penn. (C. N. J.), to Reading Co. stations, rates ranging from 70c to \$2.20 per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates on analogous articles for like distances, conditions and service.

15910. Common **sand and gravel**, carloads, from Springtown, N. J., to Kenvil and Chester, N. J., 81c per ton of 2000 lb. Reason—To place shippers at Springtown, N. J., on comparable basis with producers in the Kenvil Succasunna district.

15920. **Crushed stone**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Stowe, Penn., to Pottstown, Penn., 40c per ton of 2000 lb.

15921. To revise rates on **crushed stone and** building **sand**, carloads, from Dickerson, Grove, Frederick, Lime Kiln, Buckeystown, Md., Engle Bakerton, Kearneysville, Martinsburg, Millville, W. Va., and Cumberland, Md., to stations on the B. & O. R. R. in West Virginia, Rinard and west to the Ohio River, including Charleston, W. Va., and points on the Monongahela Ry. in West Virginia, crushed stone rates ranging from 90c to \$2.30 per ton of 2000 lb.; common sand, from Cumberland, Md., only, rates ranging from 90c to \$1.80 per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates on like commodities from and to points in the same general territory, also in accordance with scale prescribed by the West Virginia Commission in Cases 1696 and 1704.

15773. (A) Building **lime**, carloads, minimum weight 30,000 lb. (B) **Agricultural**, land, chemical, gas or glass lime, carloads, minimum weight 30,000 lb., also ground limestone, carloads, minimum weight 50,000 lb., to Mt. Savage, Md., from Bellefonte and Pleasant Gap, Penn. (A) 10c, (B) 9½c and from Stover, Penn., (A) 9½c, (B) 9c per 100 lb. (Subject to Rule 77.) Reason—Proposed rate is comparable with rate now in effect from State Line, Penn., as per P. R. R. Tariff G. O. I. C. C. 14567.

15792. **Gravel and sand**, N. O. I. B. N. in O. C., except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from New Milford, Penn., to Elmhurst, Penn., 85c; Moscow, Penn., 90c, and Gouldsboro, Penn., \$1.05 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Lime Ridge, Penn., to Scranton, Penn., Sherburne to Marathon, N. Y., and Messengerville, N. Y.

15793. (A) **Stone, crushed** or broken and stone screenings, carloads; (B) stone, ground and rough, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from York, Penn., to Brodbeck, Penn., Sinsheim and Valley Junction, Penn. (A) 70c, (B) 76c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates now in effect from Bittinger to Thomasville, Penn., per W. Md. Ry. I. C. C. 7760.

15817. **Sand**, blast, engine, foundry, glass, molding or silica, carloads, from Eldred, Penn., to DuBois, Corry, Erie, Penn., Dunkirk, N. Y., \$1.53, and Buffalo, N. Y., \$1.39 per ton of 2,000 lb.

Reason—Proposed rates compare favorably with existing rates on like commodities from and to points in the same general territory.

15826. (A) Sand, blast, engine, foundry, glass, molding, quartz, silex and silica, carloads. (B) **Gravel and sand**, N. O. I. B. N. in Official Classification, except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Harlem Transfer Co.'s Terminal, 135th St. and Harlem River, New York, N. Y., to Norwich, N. Y., (A) \$3.30; (B) \$3 per ton of 2000 lb.

Reason—Proposed rates are fairly comparable with rates now in force on like commodities from and to points in the same general territory.

15827. **Gravel and sand**, other than blast, engine, foundry, glass, molding or silica, carloads, from Machias, N. Y., to Freedonia to Falconer Junction, inclusive, \$1.10 per ton of 2000 lb.

Reason—Proposed rate is fairly comparable with rates now in effect on like commodities from and to points in the same general territory.

15834. **Gravel and sand**, N. O. I. B. N., in O. C., including blast, engine, foundry, glass, molding, quartz, silex and silica sand, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Mount Arlington, N. J., to Dover and Rockaway, N. J., 85c per ton of 2000 lb. Reason: To place Mount Arlington on a comparable basis with rate from Lake Junction, N. J.

15839. **Crushed stone**, carloads, minimum weight 90% of marked capacity of car, from Lime Crest, N. J., to Hopatcong, N. J., 81c per ton of 2000 lb. Reason: Proposed rate is the same as now in force from Millington, N. J., to Hopatcong, N. J., per D. L. & W. R. R. I. C. C. No. 21371.

15843. **Gravel or sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Baltimore, Md., and Patapsco, Md., to Carlisle, Penn., \$1.40 per ton of 2000 lb., to expire December 31, 1927. Reason: To establish rate comparable with those in force now carried for hauls of similar distances in the same general territory as per P. R. R. G. O. I. C. C. 14343 and 13777, W. Md. I. C. C. 7778 and B. & O. I. C. C. 21028.

15658. **Lime, agricultural**, chemical, gas, glass or land lime, carloads, minimum weight 30,000 lb., except on ground limestone, 50,000 lb., from Bainbridge, Penn., to Palmyra, Penn., 11c per 100 lb. in lieu of 10c as shown in original proposal.

15727. **Sand**, common, **and gravel**, carloads, from Palmerton, Penn., to Haucks, East Mahoney Jct., Barnesville, Penn., \$1.05 per 2000 lb.; Tuscarora, Middleport, New Philadelphia, Port Carbon Palo Alto, Pottsville, Hecla, New Ringgold, Penn., \$1.25 per 2000 lb. Reason—Proposed rates are comparable with rates now in effect from and to points in the same general territory.

15733. **Sand and gravel**, carloads, from Springtown, N. J., to Pittstown, N. J., 90c per ton of 2000 lb. Reason—Proposed rate compares favorably with rate to Clinton, N. J.

15768. **Crushed stone**, carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from Albuttis, Penn., to Reading company points; Philadelphia, Lyons, Hancock, Catasauqua, Dauphin, Slatington, Shamokin, Herndon, Coatesville, Penn., and various rates ranging from 65c to \$1.60 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

12747. **Sand**, common or run of bank, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to cubical or visible capacity, actual weight will apply, from New Bedford, Mass., to Attleboro, Brockton, Mass., Pawtucket, R. I., Tremont, Walpole, Whitman, Mass., Woonsocket, R. I., 4½c; to Fitchburg, Lowell, Worcester, Mass., 5c. Reason: To equalize competitive conditions among producers of sand on the N. Y., N. H. & H. R. R.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3985. **Sand and gravel**, carloads, from Allison Branch, Ill., to Lawrenceville, Ill. Rates in cents per net ton. Present, 60c; proposed, 50c.

2372. **Sand and gravel**, other than glass, silica or molding, minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity, actual weight will apply but not less than 50,000 lb., from Joliet, Ill., to Seneca, Ill. Rates in cents per net ton. Present, 76c; proposed, 70c.

4125. **Crushed stone**, carloads, minimum weight marked capacity of car, from McCook, Ill., on C. & I. W. R. R. to Leighton, Prairie View, Wheeling and Aptakisic, Ill., on M. St. P. & S. S. M. Ry. Rates in cents per ton of 2000 lb. Present rate, 88; proposed, 85.

WESTERN TRUNK LINE DOCKET

2556G. **Sand**, silica, carloads, minimum weight 90% of marked capacity of car, except that when actual weight, loaded to full visible capacity, is less, actual weight shall be the minimum weight, but in no case less than 40,000 lb., from Bay City, Wis., to Waukegan, Lake Forest and Glencoe, Ill. Present rate, 12c per 100 lb., being the application of the St. Paul-Chicago rate; proposed, 9½c per 100 lb.

1564-I. **Crushed stone**, carloads, minimum weight 90% of marked capacity of car, except where car is loaded to full visible capacity, when actual weight will apply, but not less than 50,000 lb., from Quartzite, Jasper and Pipestone, Minn., to Ute, Ia. Present, class rates; proposed, 8½c per 100 lb.

1564J. **Crushed stone** and related articles (such as lead or zinc mine refuse) and stone (rubble and rip-rap), carloads, from Jasper, Pipestone, Quartzite Minn., and Sioux Falls, S. D., to Palla and Sigourney, Iowa. Present, to Pella 11c, to Sigourney 12c per 100 lb.; proposed, to Pella 10c, to Sigourney 11c per 100 lb.

Energy Company Building New Plant

THE Energy Coal and Supply Co., Poplar Bluff, Mo., is erecting a new gravel washing and sizing plant on the banks of Black river near Keener, Mo. Most of the buildings are already up, and new and modern machinery has been ordered and will be installed on arrival. The plant will cost approximately $25,000 when completed and will be ready for operation by September.

The Energy company has been operating a gravel plant at a point about one-fourth mile from the site of the new one for several years. Scarcity of gravel at this point necessitated a change of location, and instead of moving the old machinery and equipment the company decided to build and equip a larger and more modern plant.

The company has also leased the entire town of Keener for a period of years, in anticipating the operation of a gravel business there for some time to come. The Keener club house will be used as a boarding and rooming house for officials and employes, while smaller dwellings will be used for quartering workmen.—*Poplar Bluff* (Mo.) *American.*

Sand and Gravel and Products Companies Unite

WILLIAM J. L. ROOP, the well-known Boston builder and engineer, has just completed reorganization and a consolidation of the New England Sand and Gravel Co. and the New England Concrete Products Co., both Massachusetts corporations, with his building and contracting business.

This merger places at the disposal of the new corporation sand and gravel plants, and an efficient concrete products plant making roofing tile, concrete blocks and brick and a line of some building materials.

The organization is headed by William J. L. Roop as president. Karl W. Battis is treasurer, David J. Abrahams is in charge of the architectural department, Daniel J. Green, long identified with the building industry of Greater Boston, is general construction superintendent. The entire organization is built up of men experts in their line of business.

Several houses that have been designed by this organization for owners are being constructed by the Roop corporation in many suburbs of Greater Boston.—*Boston Herald.*

County Highway Officials Meeting

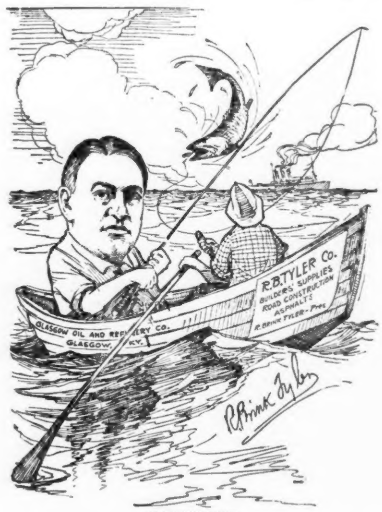
THE Division of County Highway Officials of the American Road Builders Association met in Jersey City, N. J. on July 25. Contact men who will serve to maintain contacts between the division and the counties have already been appointed in several states.

Eight committees to report on various phases of highway construction and maintenance were appointed. Papers on methods, materials and machinery will be presented at the annual "Road Show" to be held in Cleveland, January 9 to 13, 1927.

Prominent Louisville Citizen Has New Responsibility

COL. "BRINK" TYLER of Louisville, Ky., a director of the National Crushed Stone Association, has long had his heart set on an annual convention at West Baden, Ind. With the recent selection of West Baden by the directors of the association for the 1928 convention, a new responsibility, it is presumed, rests on Col. Tyler. Bearing in mind, however, his record as host and chairman of the entertainment committee of a convention held not so many years ago at Louisville, we know neither Col. Tyler nor the directors and members of the National Crushed Stone Association need worry about the success of the 1928 convention.

Louisvillians and Their Hobbies



R. BRINK TYLER

(Courtesy of Building Supply News)

This is how one of the local papers recently featured R. Brink Tyler, well-known citizen of Louisville, Ky., who operates the R. B. Tyler Co. His pet hobby must evidently be well known

Wisconsin Talc Mine

A WISCONSIN local paper describes a reportorial visit to the soapstone mine of the American Talc Co., Plymouth, which the paper states is the only underground operation in central Wisconsin. The mine is near Milladore in Wood county, and it began production last fall.

The shaft is down about 100 ft. and is furnished with a 15-hp. gasoline hoist. A small gas engine runs the pump that is necessary to keep the mine dry and another of larger size runs the compressor for the air drills. The soapstone is shipped to Joliet, Ill., to be ground.

Regional Safety Meeting Held in Pittsburgh

ABOUT 100 men, representing cement mills and quarries in Pennsylvania, West Virginia and Ohio, met in the William Penn hotel in Pittsburgh, Penn., recently with representatives of the National Safety Council for a regional safety meeting. Among those present were:

David M. Kirk, of the Crescent Portland Cement Co.; E. D. Barry, of the Universal Portland Cement Co., chairman of the local committee; A. J. R. Curtis, assistant to the general manager of the Portland Cement Association, and George E. Clarkson, executive secretary of the Western Pennsylvania Safety Council; Geoff A. Saeger, chemical engineer in charge of safety of the Crescent company; Francis Feehan, of the mine safety division of the United States Bureau of Mines; H. F. Webb, of the West Penn system, and N. V. B. Ziegler, of the United States Aluminum Co., New Kensington.

The meeting closed with a banquet. C. D. Auel, manager of the employes service department of the Westinghouse company, was the banquet speaker. G. E. Clarkson was toastmaster.

Canada Cement Co. Plant Wins Trophy

IN the presence of representatives of the provincial government of Manitoba, the city of Winnipeg, various organizations and employes of the plant, a large granite trophy, in recogntion of the fact that the 175 employes of the concern went through 1926 without an accident, was unveiled with suitable ceremonies in front of plant No. 13 of the Canada Cement Co., Ltd., Fort Whyte, Man., on July 20. The trophy was awarded by the Portland Cement Association, which endeavors in this way to stimulate interest in safety work. Since the award was established in 1925, six plants on the North and South American continents have won similar monuments, but only two of them obtained a perfect record.

J. R. Dowrie, superintendent of the plant, was in charge of the ceremonies and introduced the various speakers. A. J. R. Curtis, Chicago, assistant to the general manager of the Portland Cement Association, made the dedicatory speech and Miss Nellie Dobson of Exshaw, Alta., an employe of the company and a daughter of one of its oldest employes, performed the unveiling ceremony. Major Newcome, chairman of the Workmen's Compensation Board of Manitoba, congratulated the management and employes of the company on their unique safety record. He pointed out that in Manitoba alone 1000 accidents occurred each month in industrial concerns, and on the average a man gave up his life in an industrial plant every six days. This made the Canada Cement Co.'s record all the more notable.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Northwest Products Men Meet at Astoria

Second Midsummer Session Is Featured By Interesting Addresses by Prominent Men of the Northwest

THE second midsummer meeting of the Northwest Concrete Products Association held at Astoria, Ore., recently brought some 60 members from the various key cities of the Pacific Northwest. They were welcomed by A. W. Norblad, president of the Astoria Chamber of Commerce.

The morning session on the first day was given over to the business of the organization with reports from the various committees. The president, W. H. Sharp, made his semi-annual report on the work of the association. A special auditing committee was appointed consisting of William McKenzie, N. Bellinger and R. L. Tucker.

Many Topics Discussed

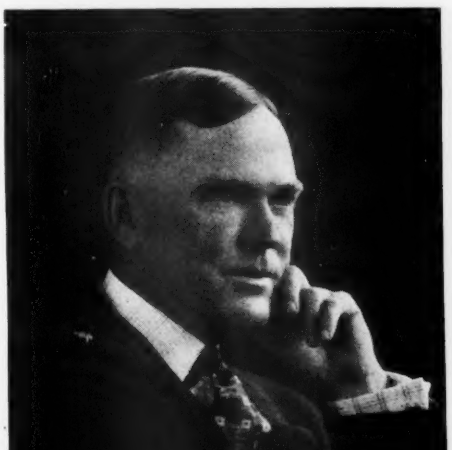
A number of interesting addresses were given, one of which was "Portland Cement Stucco," by Vyvan Dent, manager, California Stucco Co. of Portland. "Coastwise Co-operation and California Convention" was the subject of an address by H. W. Chutter, who was the official representative of the California Associated Concrete Pipe Manufacturers. He was followed by Prof. S. H. Graf of the Oregon Agricultural College, and who for the past 19 years has been in charge of the testing laboratories in the engineering department of this school, who said in part:

"During the past few years there are very few inventions having real merit that have come into our hands. Oregon is credited with having a highly efficient highway department and the present methods of construction are largely the result of scientific experiments, giving this state splendid roads at low cost. That concrete failures are rare these days is due to the high quality of materials used. Our department in the college has made more requests for information on cement and concrete products than for any other material."

In concluding the first day's session President Sharp congratulated the members who had secured certificates of quality, as it was found that some 19 had already received them, a good many of the tests having been made by Prof. Ira L. Collier of the University of Washington. He also cautioned these members to strive at all times to live up to these certificates and maintain a high quality in their products and not just have the certificate framed.

Advised to Look After Credits

George W. Herron, secretary of the Building Material Dealers' Credit Association of Portland, opened the second day's session with an address on "Credits" and cautioned the manufacturers to look well to this side of their business or they would be unable to continue in business. He stated that business has many incompetents, and the manufacturer in selling should figure to sell the job and not the contractor, and for them also to protect their lien rights. He believed it good business to have a credit man and to stand by his decisions. He also cautioned them against cutting prices and urged them to maintain good service at all times and not to figure on how cheaply they could take care of credits but how efficiently. His discourse ended with a discussion among the members as to whether or not it was good policy to go after the money on delivery of the last load or wait until completion of the job.



W. H. Sharp, president, Northwest Concrete Products Association

The outstanding address of the convention was given by M. W. Loving of the American Concrete Pipe Association of Chicago, on the "Future of the Concrete Pipe Industry." He immediately put it squarely up to the assembled manufacturers in the few words, "It all depends on you," and said that what was done in the future would only be accomplished by the full co-operation of all manufacturers. Also, to a great extent, what good or evil is done in the manufacture of concrete products in one section of the country is reflected elsewhere both in domestic and foreign business. He stated that in his travels he had found that the majority of manufacturers had a full knowledge of fabrication and endeavored to put out products of good quality, and cautioned the manufacturers not to try and get by with poor stuff, and that one of the best ways was to continually check the products and be a harsh judge.

He gave some interesting comparisons between the concrete and clay products in a number of the large centers, notably in San Diego and San Francisco, where after using both kinds these two latter cities were now 100% for the concrete. It was found that 80% of the failures in vitrified clay lines were due to tree roots, and that in all cases where concrete was used no such trouble had been experienced. The only places where concrete failed was due to poor manufacture. He declared that engineers today are demanding better fabrication, that the future looked promising and that manufacturers generally are aiming at a high standard of quality.

Association Work Meeting with Success

Mr. Loving declared that the association work was meeting with success in all quar-

ters and at all times they were urging the manufacturers to forget price and to maintain quality at all times, as that is what counts in the long run and continues to popularize concrete. He cited that in many instances competitive clay men have endeavored to buy untrue statements detrimental to the concrete industry.

He asked for an expression from the assembled members as to their acceptance and appreciation of the standard specifications, which had only been attained by 20 years of effort and six years of battling, and declared that they are the greatest protective measure yet adopted by the concrete pipe manufacturer. All those in attendance went on record as approving them.

Sewer Pipe Reinforcement

It was also the expression of the majority of the members that sewer pipe of 24 in. be reinforced, and this subject was discussed at some length and it was found that few manufacturers in this section start to reinforce their pipe under 27 in.

As the ethics committee had no report, it was decided this subject should be brought up at the January meeting. The irrigation committee also will bring in a detailed report at the fall meeting. On the resolutions committee the following were appointed: Leo R. Merritt, C. W. Lawton and Bert Westbrook.

Portland Selected as Next Meeting Place

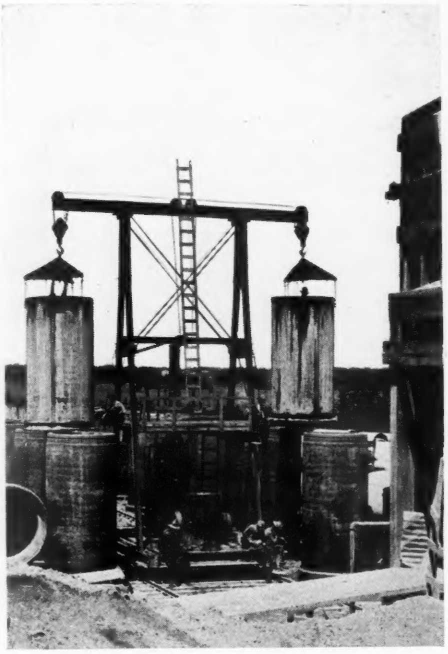
Astoria members were thanked for the excellent entertainment provided for the guests, and at the conclusion Portland was unanimously selected as host for the annual convention which will be held in January, at which time new officers will be elected.

The executive committee of the Northwest Concrete Products Association consists of W. H. Sharp, president; E. V. Bull, first vice president; Hans Mumm, Jr., second vice president; J. R. Newell, third vice president; J. J. Collins, secretary-treasurer; F. R. Zaugg, executive secretary.

New Type of Concrete Pressure Pipe

A SOMEWHAT unusual form of concrete pipe is now being manufactured at Forth Worth, Tex., under the Trammell system, a development of J. D. Trammell, consulting engineer, Ft. Worth, Tex. These pipe, of the bell and spigot type, are made in standard sizes with the 36-in. to 60-in. in the majority.

The principal feature of design is a spe-



Gantry handling 60-in. pipe forms at the Fort Worth Plant

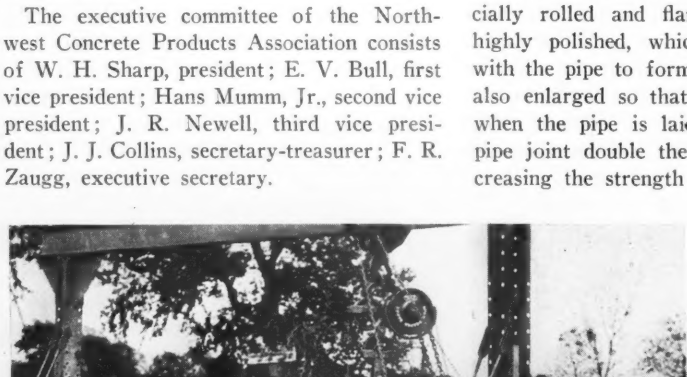
cially rolled and flanged copper cylinder, highly polished, which is molded integral with the pipe to form the bell. The bell is also enlarged so that it acts as a stiffener when the pipe is laid and also makes the pipe joint double the thickness thereby increasing the strength of the joint. In fact,

Laying a 60-in. pipe line at Fort Worth, Texas

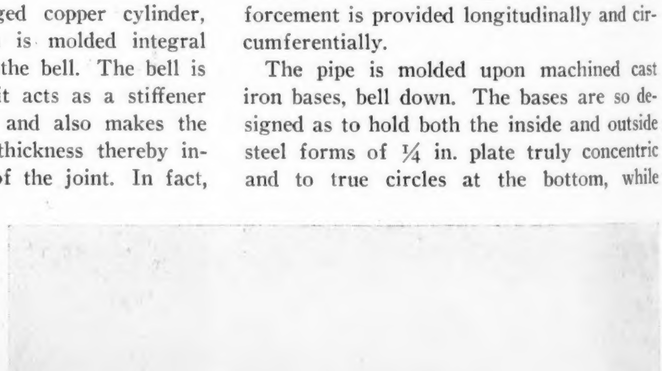
the makers say, the joints become the strongest parts of the pipe line.

In laying the pipe, the space between the the copper bell and the spigot is packed with jute to the point where the groove begins. The key, which may be either lead or cement, is then molded into the groove to make the joint tight. The claim is advanced that the casting of the cement or lead key against the smooth copper surface of the bell gives two equally smooth surfaces which slip easily upon each other without leakage or undue stresses or strains whenever expansions, contraction deflection, subsidence or vibratory movements take place. The bell and spigot are reinforced by a rolled, ribbed, welded steel ring. Additional reinforcement is provided longitudinally and circumferentially.

The pipe is molded upon machined cast iron bases, bell down. The bases are so designed as to hold both the inside and outside steel forms of ¼ in. plate truly concentric and to true circles at the bottom, while



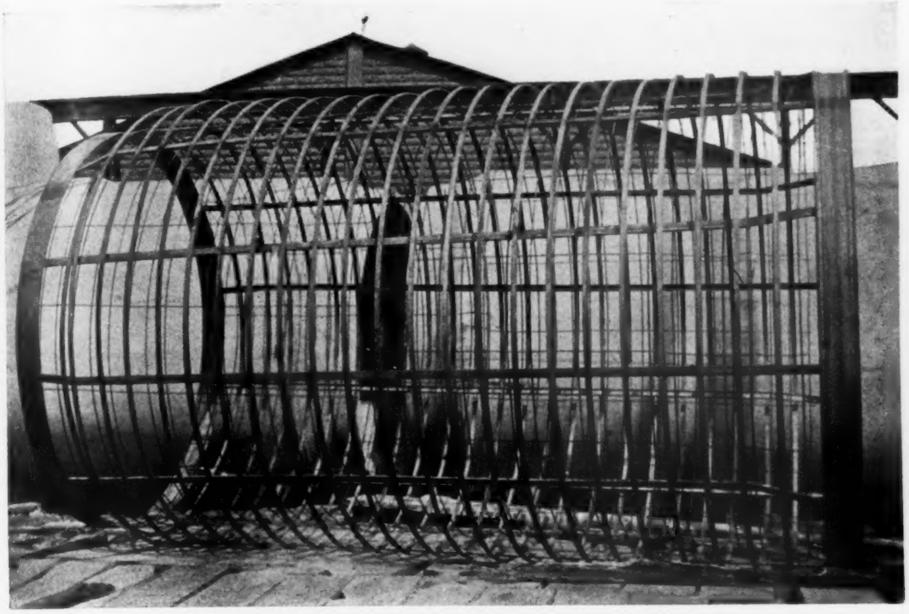
Laying 36-in. pipe at Dallas, Texas



Stock of 48- and 60-in. pipe at Fort Worth, Texas

other similar machined castings serve the same purposes at the top end of the molds.

The reinforcing varies to correspond with the pressure and consists of an inner cage of National Fabric No. BH-38 and an outer cage of round or flat bars. The longitudinal



Reinforcing cage for the 84-in. concrete pipe

reinforcing is small channels, to which the end bands and some of the others are electrically spot welded thus forming a very rigid type of construction.

The concrete mix used is about 1:1½:2½. The proportions of sand and gravel or stone may vary but remain together as four parts to the one of cement. From 3% to 5% of Celite is incorporated in the mix to increase workability of the mass.

Manufacture of Asbestos-Cement Products in Switzerland

THE manufacture of "Eternite," an asbestos-cement product in Switzerland, dates back to 1903, or five years after it was discovered by Hatschek. Asbestos was found at that time in the cantons Wallis, Graubünden and in the vicinity of the Gotthard, where it occurred at considerable elevation. The manufacture is carried on in Niederurnen, canton Glarus. The company increased its output within the first six years to 586,000 sq. m. (6,260,000 sq. ft.) Eternite slabs. The following five years marked a further increase to 1,851,000 sq. m. (19,900,000 sq. ft.).

The war produced difficult conditions of manufacture and marketing, which were overcome in 1920, when the production reached 1,500,000 sq. m. It has been increasing steadily since that time. Asbestos obtained in Switzerland was soon replaced by Canadian and South African asbestos, as the native product was mined with great difficulty due to high elevations and meager resources. Part of the asbestos is now supplied by Cyprus.

Hornblende asbestos is not particularly suitable for the manufacture of Eternite on account of its brittle character. The best material is the serpentine asbestos with length of fibers of 30 c.m. (almost 12 in.) and of a brilliant olive green color. In recent years it has been imported mostly from South Africa; however, Russian imports may gain in importance within the next few years.

The manufacture of asbestos tile resembles the manufacture of paper and celluloid; at least, this is true of the preliminary and dehydrating treatment. Asbestos is separated in edge runners, so that the material acquires the appearance of raw cotton or cellulose, the length of fibers being reduced to 5 to 8 m.m. (0.2 to 0.32 in.). A powerful electromagnet located above the conveyor removes all the iron present in the mass. The asbestos is then forced through fine sieves to separate the thicker fibers into their constituent fibers of extreme fineness. This process is similar to one used in the manufacture of celluloid. The material then enters the mixing floor, where it is first gradually mixed with water. Then the portland cement is added with coloring matter if desired, the entire mass mixed thoroughly and emptied into mixers below, where it is kept agitated until used to avoid segregation. A slowly moving bucket conveyor lifts the mass, of the consistency of a thick fluid, to the "cardboard" machine, which, as its name indicates, is similar to that used for dehydration in paper manufacture. The material is picked up by revolving cylinders covered with a wire mesh and dipping into troughs. It is scraped off of these on to a continuous belt which takes it to the molding machine. The excess water passes through the sieve or is absorbed by the felt and subsequently forced out by means of compressed air. The molding machine cuts the slabs to size with respect to width and length. A special cutting machine is provided to give the partly dried slabs their final dimensions. Eternite acquires its ultimate strength after four to eight weeks of curing. It is then brought into the shop where it is planed, drilled, turned or filed, in accordance with its destination. To avoid losses due to setting of unused material, the process is continuous, and the Swiss Eternite plant operates day and night, producing daily 10,000 sq. m. (107,640 sq. ft.) Eternite in Niederurnen, which necessitates a daily consumption of 60,000 kg. (380 bbl.) cement.

The uses of Eternite are varied and numerous; it is most familiar as roofing or wall covering. Eternite roofing tile has acquired great popularity, as it is cheaper than slate and has the additional advantages of light weight and fire-resisting properties. It is extensively used for wall paneling in Switzerland. The material is pressed in a hydraulic press, resulting in increased density and removal of the water at a pressure of 300 kg. c.m.^{2} (4300 lb./in.^{2}).

Eternite is manufactured in a variety of sizes and shapes. Aside from the roofing and wall slabs, corrugated slabs are manufactured resembling corrugated steel, but rustproof and suitable for use in Switzerland as well as in the tropics. Extensive use is found for Eternite in the manufacture of electrical devices, as it is able to compete with marble, combining light weight, insulating properties and ease of workmanship. Switchboards, electric dryers and furnaces, cable conduits, etc., are made of Eternite. Eternite is also used for flower vases, flower boxes and tables, panels, window sills and watering troughs, as well as for window casings in industrial buildings. Rural buildings appear to hold promise of utilization of Eternite in the future. It has an advantage over steel frames, as it has high strength and light weight without the disadvantage of "sweating." Eternite is also used for pipe manufacture, chiefly in Italy, though since it requires special equipment it may claim to be an industry in itself—*L. Neuberger, Zement* (1927), 338,339.

Universal Block Company Buys Lancaster Holdings

EDWIN B. RAMSEY, who bought the majority stock in the Lansing Cast Stone Co., Lansing, Mich., in 1921, is reported to have sold his holdings Wednesday to the Universal Block Co. consisting of Arthur Foster and George Leverence. The Universal company has already taken control of the Lansing Cast Stone Co. property.

Originally the company was controlled and founded by a combination of Bay City and Lansing capital. Mr. Ramsey, after quitting the contracting business, bought control in the company and has personally managed it since.—*Lansing* (Mich.) *Journal.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	....
Dundas, Ont.	3.04	1.05	1.05	.90	.90	.90
Frederick, Md.	.75	1.35	1.25	1.15	1.05	1.05
Munns, N. Y.	1.00	1.40	1.40	1.25	1.25	....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	....
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	....
Walford, Penn.	....	....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	....	....	.50	.75	....	1.50
Alton, Ill.	1.85	....	1.85	....	....	....
Buffalo and Linwood, Iowa	1.10	....	1.45	1.25	1.30	1.30
Chasco, Ill.	1.00@1.30	....	1.00@1.15	....	1.00@1.15	....
Columbia, Krause, Valmeyer, Ill.	1.10@1.50	1.10@1.25	1.20@1.35	1.10@1.35	1.10@1.35	‖1.25
Flux (Valmeyer)	1.10@1.50	....	....	1.75	....	1.75
Greencastle, Ind.	1.25	1.25	1.15	1.05	.75	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Milltown, Ind.	....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	....
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	....	1.15	1.05	1.00	1.00
St. Vincent de Paul, Que.	.75	1.35	1.15	.85	.80	.90
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Waukesha, Wis.	.90	.90	.90	.90	.90	....
Wisconsin Points	.50	....	1.00	.90	.90	....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Alderson, W. Va.	.50	1.40	1.35	1.25	1.20	1.15
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	....	2.65	2.65	2.40	2.00
Cartersville, Ga.	....	1.50	1.50	1.35	1.05	....
Chico, Tex.	1.00	1.35	1.25	1.20	1.10	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	....
Ft. Springs, W. Va.	.50	1.35	1.35	1.20	1.20	....
Graystone, Ala.			Crusher run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, $1 per ton			
Ladds, Ga.	....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	....	1.25	1.25	1.25	1.00	....
Rock Hill, St. Louis Co., Mo.	1.30	1.35	1.35	1.30	1.30	1.50
Sugar Creek, Mo.	1.15*	1.60†	1.60‡	1.60§	1.00¶	

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.25	1.75	1.55	1.35	1.25
Dwight, Calif.	1.00	1.00	1.00	.90	.90	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.55	1.25	1.10	....
New Haven, New Britain, Meriden and Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.40	2.00	1.80	1.40	1.40	....
Oakland and El Cerito, Calif.	1.00	1.00	1.00	.90	.90	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
San Diego, Calif.	.50@ .75	1.25@1.50	1.25@1.50	1.10@1.25	1.10@1.25	....
Springfield, N. J.	1.70	2.20	2.10	1.70	1.60	1.60
Toronto, Ont.	....	3.58@4.05	3.05@3.80	....	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	....
Columbia, S. C.—Granite	....	2.00	1.75	1.75	1.60	....
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.			Crushed flint rock, 2.50 per cu. yd.			
Graystone, Ala.—Granite	.50	....	....	....	....	....
Lithonia, Ga.	.75a	1.75b	1.60	1.40	1.35	....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@3.00
Richmond, Calif.—Quartzite	.75	....	1.00	1.00	1.00	....
Rochester, N. Y.			Dolomite, all sizes, $1.50 per ton			
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.—Granite	.50	1.35	1.35	1.30	1.25	1.25

*¼ to ½ in. †¼ to 1 in. ‡¾ to 1¾ in. §¼ to 2¼ in. ¶Dust.
‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2in., 1.30. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (e) Agstone to June 15, 1927. [1]¾ to ¼ in. [2]1 to ¼ in. [3]1½ to ¼ in. (A) Plus 4% sales tax, less 2% discount 30 days.

Agricultural Limestone

(Pulverized)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	4.50
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 4½%; 50% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50-mesh	1.50
Charleston, W. Va.—Marl, per ton, bulk	3.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh	2.25
Colton, Calif.—Analysis, 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 4 mesh	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
(Paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.25; bulk	3.75
Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
80% thru 200 mesh, bags, 4.25; bulk	3.00
Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50@ 2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk, 1.75; bags	3.75
Marl—Analysis, 90% $CaCO_3$; 10% $MgCO_3$; bulk, 2:25; bags	4.00
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 99% thru 20 mesh; bulk, 5.00; bags	7.00
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 95%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio—30% thru 50 mesh	2.25
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25
Carload, 7.50; less than carload	9.00

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 95% thru 10 mesh	1.50

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh		1.75
50% thru 4 mesh		1.50
Chicago, Ill. — 50% thru 100 mesh; 90% thru 4 mesh		.80
Columbia, Krause, Valmeyer, Ill. — Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@	1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh		1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk		3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh		1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh		1.50
Kansas City, Mo. — 50% thru 100 mesh		1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh		2.00
Screenings (¼ in. to dust)		1.00
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk		1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@	2.35
McCook, Ill.—90% thru 4 mesh		.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh		1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh		1.50
Mountville, Va. — Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags		5.00
Pixley, Mo. — Analysis, 96% $CaCO_3$; 50% thru 50 mesh		1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh		1.65
River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@	1.40
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh		.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes		1.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh, 2.30; 90% thru 50 mesh		1.75

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk		3.00
Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh; bulk		3.50
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@	3.50
Rocky Point, Va.—92% thru 100, mesh, bulk	2.25@	3.50
Waukesha, Wis.—90% thru 100 mesh, bulk		4.50

*Bags extra.

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Buffalo, N. Y.	2.00@	2.50
Cedarville and S. Vineland, N. J.—Damp		1.75
Dry		2.25
Estill Springs and Sewanee, Tenn.		1.50
Franklin, Penn.		2.25
Gray Summit and Klondike, Mo.	1.75@	2.00
Klondike, Mo.		2.00
Los Angeles, Calif.—Washed		5.00
Massillon, Ohio		3.00
Mendota, Va.	2.25@	2.50
Michigan City, Ind.		.35
Mineral Ridge and Ohlton, Ohio		2.50
Oceanside, Calif.		3.00
Ohlton, Ohio		2.50
Pittsburgh, Penn.	3.00@	4.00
Ridgway, Penn.		2.50
Rockwood, Mich.	2.75@	3.25
Round Top, Md.		2.00
San Francisco, Calif.	4.00@	5.00
Silica, Va.		2.50
St. Louis, Mo.		2.00
Sewanee, Tenn.		1.50
Thayers, Penn.		2.50
Zanesville, Ohio		2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	....	1.75
Columbus, Ohio	....	.15@ .30
Dresden, Ohio	....	1.00@ 1.25
Eau Claire, Wis.	4.25	.40@ 1.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.65	.65	.65	.65	.65	.65
Boston, Mass.‡	1.40	1.40	2.25	....	2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	....	1.00*	....	1.50*	1.75*	....
Leeds Junction, Me.	....	.50	1.75	....	1.25	1.00c
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	1.00	.75	.75	.60	.60
Northern New Jersey	.50	.50	1.00@1.25	1.00@1.25	1.00@1.25	....
Portland, Me.	....	1.00	2.25	....	2.00	....
Shining Point, Penn.	....	....	1.00	1.00	1.00	1.00
Somerset, Penn.	....	2.00	....	....	....	....
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.†	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Aurora, Yorkville, Sheridan, Oregon, Moronts, Ill.	.50	.40	.20	.45	.60	.55
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.	....	.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Barton, Wis.	....	.50	.75	.75	.75	.75
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio	....	.75	....	.75	.75	....
Des Moines, Iowa	....	.30	1.30	1.30	1.30	1.40
Eau Claire, Wis.	.40	.40	.60@ .80	.90	.90	....
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ferrysburg, Mich.	....	.50@ .80	.60@1.00	.60@1.00	....	.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.	....	.60@ .80	.70@ .90	.70@ .90	....	.70@ .90
Grand Rapids, Mich.	....	.50	....	.80	.80	.70
Hamilton, Ohio	....	1.00	....	....	1.00	....
Hersey, Mich.	....	.50	....	....	....	.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60	....	.90	.75@1.00	.75@1.00
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.	....	....	....	1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .50	.40@ .50	1.40	1.35	1.25	....
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.20	1.45	1.55a	1.45	1.45	1.45
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.35	1.25	1.15
Zanesville, Ohio	....	.60	.50	.60	.80	....
SOUTHERN:						
Charleston, W. Va.	1.40	1.40	1.40	1.40	1.40	1.40
Brewster, Fla.	.45	.45	2.25	....	....	....
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Chattahoochie River, Fla.	....	.70	....	1.75	....	....
Eustis, Fla.	....	.50	....	....	....	....
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	....	.50	....	....	.90	....
New Martinsville, W. Va.	1.00	.90@1.00	....	1.20@1.30	....	.80@ .90
Roseland, La.	.35	.35	1.25	1.00	.65	.65
WESTERN:						
Kansas City, Mo.	....	.70	....	....	....	....
Los Angeles, Calif.	.40	.40	.25@1.00	.25@1.00	.25@1.00	.25@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Phoenix, Ariz.	1.25	1.00	2.00	1.50	1.75	1.00
Pueblo, Colo.	.70	.60	....	1.20	....	1.15
San Diego, Calif.	....	.40@ .50	.80@1.00	.80@1.00	.65@ .80	.65@ .80
Seattle, Wash. (bunkers)	1.25	1.25	1.25	1.25	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.	....	....	....	....	....	.60
Burnside, Conn.	.75	....	....	....	....	....
Des Moines, Iowa	.50	....	....	....	....	....
Ferrysburg, Mich.	....	....	....	....	....	.65@1.00
East Hartford, Conn.	.75*	....	....	....	....	....
Gainesville, Texas	1.15	....	....	....	....	.55
Grand Rapids, Mich.	....	....	....	.50	....	....
Hamilton, Ohio	....	....	....	....	1.00	....
Hersey, Mich.	....	....	....	.50	....	....
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Lindsay, Texas	....	1.10	....	....	.55	....
Macon, Ga.	.35	....	....	....	....	....
Mankato, Minn.	.30	....	....	....	....	....
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.	....	....	....	....	.50	....
Somerset, Penn.	....	1.85@2.00	....	1.50@1.75	....	....
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00	....	....	....	....

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. †Rewashed.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.	....	....	....	.30@ .35	....	....	....
Albany, N. Y.	....	2.00	2.00	2.25	1.50	1.50	3.50
Arenzville, Ill.	1.50@1.75	....	....	1.00	....	....	....
Beach City, Ohio	1.75	1.75	....	1.75	1.75@2.00	....	....
Buffalo, N. Y.	1.50	1.50	....	2.00@2.50	....	....	....
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	....
Dresden, Ohio	1.50@1.75	1.25@1.50	1.50@1.75	1.00@1.25	....	....	....
Eau Claire & Chippewa Falls, Wis.	....	....	....	....	....	3.00	....
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25	....	....	1.25	....	1.35@1.50	....
Franklin, Penn.	1.75	1.75	....	1.75	....	....	....
Kasota, Minn.	....	....	....	....	....	....	1.25
Klondike, Mo.	....	....	....	2.00	2.00	....	2.00
Massillon, Ohio	2.25	2.25	....	2.25	2.50	....	....
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.	....	....	....	.30@ .35	....	....	....
Millville, N. J.	....	....	....	1.75b	....	3.50	....
Montoursville, Penn.	....	....	....	1.35@1.50	....	....	....
New Lexington, O.	2.00	1.25	....	....	....	....	....
Ohlton, Ohio	1.75b	1.75b	....	2.00b	1.75b	1.75b	....
Ridgway, Penn.	1.50	1.50	1.75@2.00c	....	....	....	....
Round Top, Md.	....	....	....	1.60	....	2.25	....
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	....
Silica, Va.	Potters' flint per ton, 9.00@10.00						
Thayers, Penn.	1.25	1.25	....	2.00	....	....	....
Utica, Ill.	.55	.65	....	.60	.75	....	....
Utica, Penn.	1.75	1.75	....	2.00	....	....	....
Warwick, Ohio	1.50*@2.00	1.50*@2.00	1.50*@2.00	1.50*@2.00	1.50*@2.00	....	....
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.50	....	....

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (g) Dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25	....	1.50	....	....	....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	....	1.45*	....
Jackson, Ohio	....	1.05*	....	1.30*	1.30*	1.30*	....
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	....	1.45*	....	1.45*	1.45*	1.45*	....
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	....

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	....	....	12.00	....	....	....	....	2.00
Buffalo, N. Y.	....	12.00	12.00	12.00	....	....	10.00	1.95[4]
Chazy, N. Y.	....	8.50	7.50	10.00	....	15.50[28]	8.50	14.00
Lime Ridge, Penn.	....	....	....	....	....	....	5.00[2]	....
Pittsburgh, Penn.	12.50	8.50	8.50	....	9.00	11.00	8.00	....
West Stockbridge, Mass.	12.00	10.00	5.60	....	....	....	....	2.00[12]
Williamsport, Penn.	....	....	10.00	....	....	....	6.00	....
York, Penn.	....	9.50	9.50	10.50	8.50	10.50	8.50	1.65[7]
CENTRAL:								
Afton, Mich.	....	....	....	....	....	....	8.40	1.35
Carey, Ohio	12.50	8.50	8.50	....	9.00	....	8.00	1.50
Cold Springs, Ohio	....	8.50	8.50	....	....	....	8.00	....
Cold Springs and Gibsonburg, Ohio	12.50	8.50	8.50	....	9.00	11.00	....	....
Huntington, Ind.	12.50	8.50	8.50	....	9.00	....	8.00	....
Luckey, Ohio	12.50	....	....	....	....	....	....	....
Milltown, Ind.	....	8.50@10.00	....	10.00[8]	....	....	8.50[22]	1.35[10]
Scioto & Marble Cliff, O.	....	8.50	8.50	9.50	8.25	.62½	7.50	1.50[3]
Sheboygan, Wis.	11.50	....	....	....	9.50	....	9.50	.95
Wisconsin points[6]	....	11.50	....	....	....	....	9.50	....
Woodville, Ohio	12.50	8.50	8.50	13.50	9.00	11.00	9.00	1.50[3]
SOUTHERN:								
Allgood, Ala.	12.50	10.00	....	....	8.50	....	8.50	1.50
El Paso, Texas	....	....	....	....	....	....	7.00	1.50
Frederick, Md.	....	9.50	9.00	9.50	....	9.00	7.00	....
Graystone, Ala.	12.50	9.00	....	12.50	....	....	8.00	1.35
Keystone, Ala.	12.50	10.00	9.00	10.00	8.50	....	8.00	1.50
Knoxville, Tenn.	20.25	9.00	9.00	9.00	....	....	8.00	1.35
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00	....	9.50	....
Ocala, Fla.	....	11.00	10.00	....	....	....	11.00	1.60
Saginaw, Ala.	12.50	10.00	9.00	10.00	....	....	8.50	1.50
WESTERN:								
Kirtland, N. M.	....	....	....	....	....	....	15.00	....
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00	....	16.20	....	12.50	2.50
Dittlinger, Tex.	....	12.00@13.00	....	....	....	....	9.50[8]	1.50[23]
San Francisco, Calif.	20.00	20.00	13.50	21.00	....	....	14.50[30]	2.15
Tehachapi, Calif.	12.80	....	....	....	....	....	12.80	....
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	....	18.60	2.30

[2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] Per 180-lb. barrel. [6] Dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65. [8] To 11.00. [10] To 1.50. [12] To 3.00. [22] To 9.00. [23] To 1.60. [28] Barrels. [29] F.o.b. Woodville. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50
Massillon, Ohio	....	2.00
Michigan City, Ind.	....	.30
Mineral Ridge, Ohio	*1.75	*1.75
Montoursville, Penn.	....	1.10
Ohlton, Ohio	a1.75	a1.60
Red Wing, Minn.	....	1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Thayers, Penn.	....	2.25
Warwick, Ohio	....	1.50a@ 2.00
Zanesville, Ohio	....	2.50

*Wet. (a) Green.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons	.08
Per gross	1.00@ 1.50
Chatsworth, Ga:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh)	8.00@10.00
Pencils and steel worker's crayons, per gross	1.00@ 2.00
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	9.00@10.00
Including bags	10.00@11.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc (for grinding)	5.00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	2.50@ 4.00
Ground talc (150-200 mesh), bags	8.50@14.75
Joliet, Ill.:	
Ground talc (20-50 mesh), bags	12.00
Illinois talc, bags	12.00
California talc, bags	30.00
Southern talc, bags	20.00
Pencils and steel worker's crayons, per gross	2.50
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (125-200 mesh), bags	10.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	360.00
Clean shop scrap	25.00
Mine scrap	22.00
Roofing mica	30.00
Punch mica, per lb.	.12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.— All colors and sizes	....	§5.00
Buckingham, Que.—Buff stucco dash	....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries	....	17.50
Crown Point, N. Y.— Mica spar	....	9.00@10.00
Dayton, Ohio	....	6.00@24.00
Easton, Penn.— Green stucco	....	12.00@18.00
Green granite	....	14.00@20.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash	....	6.00@24.00
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	....	5.50@ 7.50
Milwaukee, Wis.	....	14.00@34.00
New York, N. Y.—Red and yellow Verona	....	32.00
Phillipsburg, N. J.— Royal	....	12.00@14.00
Virblend	....	10.00@12.00
Randville, Mich.¶— Crystalite crushed white marble, bulk	5.00@ 7.50	4.50@ 7.50
Stockton, Calif.—"Natrock" roofing grits	....	12.00@15.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	....
Wauwatosa, Wis.	....	22.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags: L.C.L. 14.50.
†C.L. L.C.L. 17.00. ¶F.O.B. cars.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 99% thru 140-mesh	19.00
Bristol, Tenn.—Color, white; analysis, K_2O, 6 to 10%; Na_2O, 2½ to 4%; SiO_2, 68 to 78%; Fe_2O_3, 12 to 20%; Al_2O_3, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade	14.50@18.00
Brunswick, Me.—Color, white; 98% thru 140 mesh, bulk	19.00
Buckingham, Que.—Color, white, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude (bulk)	7.00
Keystone, S. D.—Prime white; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 10.20%; crude	10.05
Pulverized, 95% thru 200 mesh; bags, 22.00; bulk	20.00
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18 20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt.—Per ton	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa—(Gypsum), per ton	18.00
Chico, Texas — (Limestone), 100-lb. bags, per ton	8.00@ 9.00
Danbury, Conn.—(Limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton	15.00
Gypsum, Ohio—(Gypsum), per ton	10.00
Limestone, Wash. — (Limestone), per ton	12.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	10.00
Warren, N. H.—(Mica), per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.—(Limestone), bulk	‡7.50@*9.00
Wisconsin Points—(Limestone), per ton	9.00

*L.C.L. †Less than 5-ton lots. ‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	12.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50@13.00
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50
Detroit, Mich.	13.75
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.50
Hartford, Conn.	16.00@19.00*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis and St. Paul, Minn.	10.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	14.50@17.00
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75*
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.00
Sioux Falls, S. Dak.	13.00
South River, N. J.	14.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	12.50@16.00†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	14.00

*Delivered on job. †City delivery. ¶Dealers' price. (a) Less 50c discount per M., 10 days.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.86¾	3.47
Atlanta, Ga.	....	2.35
Baltimore, Md.	....	2.15
Birmingham, Ala.	....	2.30
Boston, Mass.	.53¼	2.13
Buffalo, N. Y.	.55	2.20
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	....	2.24
Charleston, S. C.	....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.58	2.32
Cleveland, Ohio	....	2.24
Chicago, Ill.	.51¼	2.05
Columbus, Ohio	.57¼	2.29
Concrete, Wash.	....	2.35
Dallas, Texas	....	2.00
Davenport, Iowa	....	2.24
Dayton, Ohio	.58¼	2.33
Denver, Colo.	.66¼	2.65
Des Moines, Iowa	....	2.05
Detroit, Mich.	....	2.15
Duluth, Minn.	....	2.04
Houston, Texas	....	2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.	....	2.50
Jacksonville, Fla.	....	2.20
Jersey City, N. J.	....	2.03
Kansas City, Mo.	....	1.92
Los Angeles, Calif.	.57½	2.50
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	....	2.50
Milwaukee, Wis.	....	2.20
Minneapolis, Minn.	....	2.12@2.22
Montreal, Que.	....	1 36
New Orleans, La.	....	2.20
New York, N. Y.	.48¼	1.93
Norfolk, Va.	....	2.07
Oklahoma City, Okla.	....	2.46
Omaha, Neb.	....	2.36
Peoria, Ill.	....	2.22
Philadelphia, Penn.	....	2.11@2.21
Phoenix, Ariz.	.81½	3.26
Pittsburgh, Penn.	....	2.04
Portland, Colo.	....	2.80
Portland, Ore.	....	2.60*
Reno, Nev.	....	2.91
Richmond, Va.	....	2.24
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	....	2.21
Savannah, Ga.	....	2.50
St. Louis, Mo.	.51¼	2.05
St. Paul, Minn.	....	2.12@2.22
Seattle, Wash.	....	2.50*
Tampa, Fla.	....	2.25
Toledo, Ohio	....	2.20
Topeka, Kan.	....	2.41
Tulsa, Okla.	....	2.33
Wheeling, W. Va.	....	2.12
Winston-Salem, N. C.	....	2.62

NOTE—Add 40c per bbl. for bags.

*Less 10c discount.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Buffington, Ind.	....	1.80
Chattanooga, Tenn.	....	2.45*
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.35
Detroit, Mich.	....	2.15
Hannibal, Mo.	....	1.90
Hudson, N. Y.	....	1.65
Leeds, Ala.	....	1.85
Mildred, Kan.	....	2.35
Nazareth, Penn.	....	2.15
Northampton, Penn.	....	1.75
Richard City, Tenn.	....	2.05
Steelton, Minn.	....	1.85
Toledo, Ohio	....	2.20
Universal, Penn.	....	1.80

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board— ¼x32x36". Wt. 1500 lb. Per M Sq. Ft.	Plaster Board— ⅜x32x36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	....	....	....	....	11.70u	....	....	....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	....	....	13.50	....	....	....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	....	....	....	....	14.30o	12.30m	....	m9.00@11.00o	....	....	....	....	....
Delawanna, N. J.	....	....	....	....	....	8.00	....	9.00	....	....	.14½	.15½	30.00
Douglas, Ariz.	....	....	6.00	....	....	....	15.00	....	40.00	13.50	35.00	45.00	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	24.55	20.00	....	....	....
Gypsum, Ohio	3.00	4.00	6.00	8.00	9.00	9.00	19.00	7.00	27.50	19.00	....	15.00	30.00
Los Angeles, Calif.	....	....	7.50@9.50	11.50y	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	11.65m	13.40r	14.40r	....	15.40r	....	....	....	....	....	....
Seattle, Wash.	....	....	10.50	13.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	21.50	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00		....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	17.00c@19.00a	....	....
Detroit, Mich.	.16	....	.18
Forest Park, Ill.	21.00*	....	....
Grand Rapids, Mich.	15.00@16.00a	....	....
Graettinger, Iowa	.18@ .20	....	....
Indianapolis, Ind	.13@ .15†	....	....
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	16.00@18.00	....	....
Olivia and Mankato, Minn.	9.50b	....	....
Somerset, Penn.	.20@ .25	....	....
Tiskilwa, Ill.	.16@ .18†	....	....
Yakima, Wash.	20.00*	....	....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Longview, Wash.: (Stone-Tile)	Per 1000
4x6x12	55.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Grand Rapids, Mich.:	
5x8x12	8.00
5x4x12	4.50

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	20.00@45.00
Mt. Pleasant, N. Y.	....	14.00@23.00
Oak Park, Ill.	....	37.00@42.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	18.00	25.00@40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	......	.40	.50	.60	.70	......	......	......	......	......	......	—
Grand Rapids, Mich. (b)																	
Culvert pipe	......	......	......	.60	.72	1.00	1.28	1.60†	......	1.92	2.32	3.00	4.00	5.00	6.00	......	—
Sewer pipe (d)	......	......	......	......	......	.63	......	.60†	......	......	......	.58	......	......	......	......	—
Houston, Texas	......	.19	.28	.43	.55½	.90	1.30	......	1.70†	2.20	......	......	......	......	......	......	—
Indianapolis, Ind. (a)	......	......	......	.80	.90	1.10	1.30	......	......	1.70	......	2.70	......	......	......	......	—
Longview, Wash.								Sewer pipe 40% off list; culvert—list									
Mankato, Minn. (b)	......	......	......	......	....	......				1.50	1.75	2.50	3.25	4.25	......	......	—
Newark, N. J.							6 in. to 24 in., $18.00 per ton										
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	......	......	......	......	......	......	......	2.25	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Somerset, Penn.	......	......	......	......	1.08	1.25	1.65	......	......	2.50	......	3.65	4.85	7.50	8.50	......	—
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	......	......	......	......	......	......	......	......	......	—
Tiskilwa, Ill. (rein.) (a)	......	......	......	.65	.75	.85	1.10	1.60	......	1.90	......	2.25	3.40	......	5.50	......	—
Wahoo, Neb. (b)	......	......	......	......	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	4.62	6.14	6.96	7.78
Yakima, Wash.								$10.00 per ton									

(a) 24-in. lengths; (b) Reinforced; (d) Eastern clay, list, 72% and 60% off.
†21-in. diam. ‡Price per 2-ft. length.

Recent Contract and Bid Prices

Watertown, Wis. Contract awarded Stuart Niere pits for 5200 cu. yd. of gravel at $1.65 per yd., delivered.

Tacoma, Wash. City paying $1.25 per ton for sand and gravel delivered to city asphalt plant.

Rolla, Mo. Agricultural limestone on pool car orders, $3 per ton f.o.b. Salem tracks.

Portland, Ore. Contracts awarded Star Sand Co., 5000 cu. yd. crushed rock at $2 per yd., delivered; Ross Island Sand and Gravel, 750 cu. yd. washed pea gravel at 55 cents per yd.

Dallas, Tex. Contract to George W. Owens Lumber Co. for 12 carloads of cement at $2.45 per bbl., less 40 cents per bbl. for sacks and 10 cents per bbl. discount for payment within 10 days of delivery.

New Orleans, La. Louisiana Portland Cement Co. established a mill base price which makes effective a reduction of 11 cets a barrel at that city.

Oregon State Crushing Plant

THE Oregon state lime plant was started in 1915 during the administration of Governor Withycombe. For the first two years the quarry and crushing plant at Gold Hill, Jackson county, were operated by convict labor; after that by free labor. During the Pierce administration the crusher was removed to the state penitentiary.

The present prices charged the farmers by the state for agricultural limestone are $5.50 per ton in bags or $4.75 in bulk, with 2% deducted for cash and 1% deducted for payment in 30 days, or 60 days net subject to bank draft. The state charges 10 cents each for sacks, with rebate on return.

The state pays for limerock $1.35 per ton, which with $2.50 per ton freight, demurrage charges and other costs makes a total cost to the state of about $4.66 a ton.

The prison plant is grinding about 60 tons a day and by October will have for delivery about 8000 tons. Orders are being booked for fall, with about 1000 tons already booked. Delivery of limerock to the prison from Marble mountain is now from one to two cars daily.—*Portland* (Ore.) *Telegram.*

Sand-Lime Brick Production and Shipments in July

THE following data are compiled from reports received direct from 20 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is eight less than those furnishing statistics for the June estimate published in the July 23 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having over one-half the production capacity in the United States and Canada.

Judging from the reports, the first half of 1927 shows a probable increase in production and shipments over the corresponding period in 1926. A slight slacking off appears at this time, following the general decline in building activity throughout the middle section of the country.

Prices remain at about the same level as in June and business in general appears to be good.

The following are the average prices quoted for sand-lime brick in July:

Average Prices for July

Shipping Point	Plant Price	Delivered
Michigan City, Ind.	$11.00	....
Detroit, Mich.	....	$16.00
Detroit, Mich.	13.00@15.00	15.55
Sebewaing, Mich.	....	....
Buffalo, N. Y.	12.20	16.25
Boston, Mass.	....	16.00
Grand Rapids, Mich.	12.50	....
Sioux Falls, S. D.	....	....
Toronto, Canada	13.50	16.00
Syracuse, N. Y.	18.00	20.00
Albany, Ga.	10.00	....
Detroit, Mich.	13.00	16.00
Jackson, Mich.	12.25	....
New Orleans, La.	....	....
Menominee, Mich.	11.00	14.50
Milwaukee, Wis.	10.50	13.00
Lakeland, Fla.	....	....
Dayton, Ohio	12.50	....
Atlantic City, N. J.	14.00	....
Madison, Wis.	12.00	14.00

The following statistics are compiled from data received direct from 20 producers of sand-lime brick in the United States and Canada:

Statistics for June and July, 1927

	*June	†July
Production	19,986,489	15,351,485
Shipments (rail)	7,552,500	5,430,650
Shipments (truck)	14,010,568	9,458,440
Stocks	10,051,577	7,036,080
Unfilled orders	18,344,000	14,364,000

*Revised to include one plant not furnishing June data previously, 28 plants reporting.

†Incomplete, four plants not reporting stocks and five not giving unfilled orders.

The Paragon Plaster Co., Syracuse, N. Y., reports the contracts for 150,000 brick to be used in the new school at Macedon, N. Y., and 300,000 brick for the Syracuse *Herald's* new building at Syracuse, N. Y. Boice Bros., Pontiac, Mich., report that they are supplying the sand-lime brick being used in the new theater at Birmingham, Mich.

The Lakeland Brick and Tile Co. of Lakeland, Fla., has sold its plant to C. W. Cadwell, who started operating under the name of the Lakeland Silex Brick Co. on August 1.

An Open Letter to the Lime Industry

THE following letter from the Board of Directors of the National Lime Association, is being widely published in order that the entire lime industry may receive it:

The Board of Directors of the National Lime Association met with the Executive Committee in Washington on July 15 and are prompted by the excellent condition of the association to communicate directly with all members. It is gratifying to find that the commitments for membership assure a larger working fund than had been anticipated at this time and that the program adopted at the convention can be carried forward from this date. Interest in the new program is increasing steadily throughout the industry.

J. F. Pollock, vice-president of the Ash Grove Lime and Portland Cement Co. of Kansas City, was elected chairman of the board. This complies with the request of the convention that the board should elect an executive head of the association. G. B. Arthur was re-elected general manager to serve throughout the coming year.

The commitments already returned put the new program into effect at once, with a headquarters force sufficient to adequately represent the industry, and to support the individual efforts of members as well as the collective efforts of groups as they are organized. The publication and distribution of association literature will be continued, and technical help can be given on specific problems.

Outside of the national office, the plan of the convention is to be carried out vigorously. The board is committed to the idea of a larger membership, which will represent the entire industry, to attain this representation as quickly as possible, and to broaden the association work through the medium of group organization by the members. Therefore, this letter is going at once to all members, to all non-members and to the press, both newspapers and magazines.

In co-operation with directors and members, this program will be presented to every responsible manufacturer and meetings are to be held for each group of members, so as to bring about unity of action in these groups. A general meeting of the industry will be called whenever it appears that the industry is ready for it.

The Board of Directors appeals to every thoughtful manufacturer for that broad and unselfish consideration of his interests (as bound up in the welfare of the industry) which will put this forward movement ahead of every other consideration. This is a time when the industry needs the best that every manufacturer can offer in a fully representative and constructive effort.

The Board of Directors,

NATIONAL LIME ASSOCIATION.

The board of directors consists of: J. F. Pollock, chairman; J. M. Deely, A. V. A. Felton, S. W. Stauffer, Reed C. Bye, S. M. Shallcross, W. E. Carson, W. R. Stolzenbach, G. J. Whelan, G. J. Nicholson, E. S. Healey, B. L. McNulty, R. C. Brown, Henry LaLiberte, J. M. Gager, M. McDermott, H. Dittlinger, J. S. McMillin, C. M. Cadman, J. J. Urschel and G. B. Wood.

Modern Lime Plant To Be Built in Florida

PRACTICALLY all the lime that has been burned in Florida has been burned in kilns with a short shaft on account of the softness of the rock. The Ocala, Fla., *Star* says that the Limestone Products Co. of Ocala, one of the important producers of the state, will depart from the usual practice and erect a modern plant with 50-ft. kilns and a hydrating plant. The paper says that this can be done because the company has opened a new deposit, five miles south of Ocala, in which the rock, containing 90% $CaCO_3$, is hard enough to be burned in a tall kiln.

The quarried material will be reduced by a jaw crusher and washed, the kiln feed taken out and the remainder sold for concrete aggregate. Oil will be used for fuel in the two furnaces, built on opposite sides of the kiln, and a recording pyrometer in the calcining zone will be used to control the temperature. A production of 15 tons per day per kiln is expected.

The hydrating plant is to be modern and to include the usual pulverizing, air-separating and sacking equipment. It will be arranged to be practically dustless. Electric power will be used throughout the entire operation. J. G. Hall is general manager of the company.

New Canadian Gravel Plant

THE John E. Russell Co., Reford Building, Toronto, has acquired 200 acres of gravel land at Waterford, Ont., and has purchased equipment for the installation of a modern plant for crushing, washing and screening gravel. This plant will serve as a short haul for western Ontario construction. Necessary buildings to house the machinery will soon be erected. The plant will cost about $75,000 and it is said that it will be the second largest in the province. In addition to other activities, the John E. Russell Co. are large manufacturers of concrete sewer pipe.

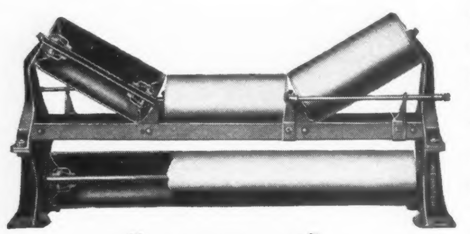
A Correction

OWING to information incorrectly received, the use of Armstrong drills was omitted from the story of the quarry and plant of the Dittlinger Lime Co., New Braunfels, Texas, published in the issue of July 23. There are two Armstrong drills, a No. 25 and a No. 50-B, which are regularly in use in this quarry, in addition to the others mentioned.

New Machinery and Equipment

New Conveyor Roll

A NEW type of conveyor, made entirely of malleable iron and steel, is now being placed on the market by the Webster Manufacturing Co., Chicago, Ill. The carrier and return rolls are made of 6-in. steel tubing and the end caps of malleable iron fitted in the tubing, with edge protruding and extending flush with the outside of the tubing. The cap is fitted tight to exclude dust from the bearings. Heavy tubing is used and the rolls are turned and balanced.



New conveyor roll

The edges of the rolls are rounded and a minimum of space left between the concentrator and horizontal pulleys. These features are to protect the belts from wear and eliminate pinching at the bend and thus add longer life to the belt, the manufacturers say.

Two Timken roller bearings of the automobile type are fitted to each roll. Special accessible adjusting collars are provided to take up wear and adjust should occasion require. The lubricating can be done while the conveyor is in motion, each bearing being fitted with high pressure lubricating system, the fittings being accessible from the outside.

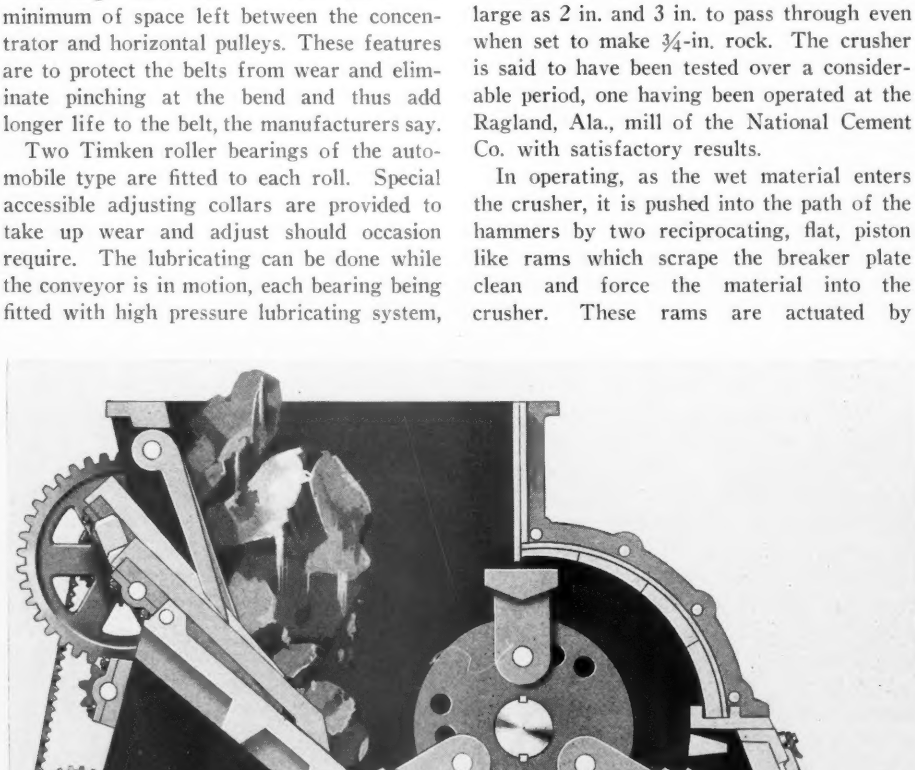
All parts, it is claimed, are easily removed from the frame—rolls can be lifted out and replaced handily, for no screws or bolts are used in assembly.

New Crusher for Wet and Muddy Rock

A NEW TYPE of hammer-mill crusher, designed to handle efficiently wet and muddy rock, is one of the recently completed developments of the Williams Patent Crusher and Pulverizer Co., St. Louis, Mo. The important features of the new mill are a so called pusher type feeder and vibrating grates for handling the wet material

The machine, it is claimed, will crush to ¾-in. size and under for cement plant work, a feature which the makers say is not possible with the tractor feed, because the latter type requires considerable clearance between the linked breaker plate and the first grate bar, and often permits stone as large as 2 in. and 3 in. to pass through even when set to make ¾-in. rock. The crusher is said to have been tested over a considerable period, one having been operated at the Ragland, Ala., mill of the National Cement Co. with satisfactory results.

In operating, as the wet material enters the crusher, it is pushed into the path of the hammers by two reciprocating, flat, piston like rams which scrape the breaker plate clean and force the material into the crusher. These rams are actuated by heavy crank shafts driven from the main crusher shaft. There is also provided an oscillating or vibrating arrangement for the grates of the machine which also operates on a crank shaft, the eccentric rolling the grate bars back and forth. The grate openings are said to always remain the same, thus eliminating possibility of oversize material getting into the finished product.



Hammer-mill crusher designed to handle wet and muddy rock

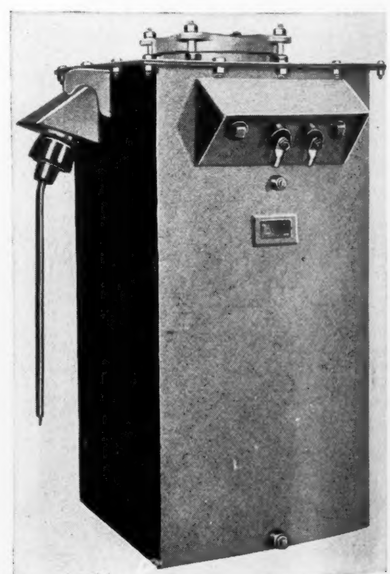
The grate bars can be raised as they wear, toward the hammers and the fast revolving hammers aid the vibrating action in keeping the grates clean and free of material.

The whole arrangement is simple with all non clog mechanism being driven from the main crusher shaft without other auxiliary drive. Only two gears are used and these are so placed and protected as to prevent entry of dirt and grit.

This new pusher type feeder and vibrating grates are now available on any size of Williams "Mammoth" "Jumbo" or "Jumbo Junior" types. Pusher feeders can also be furnished for certain old models of Williams hammer crushers.

New Distribution Transformers

THE Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., has introduced types SB and SKB distribution transformers for industrial application that are designed and constructed to operate under severe conditions of vibration and handling. The coils and iron in the tank are protected with extra heavy bracing and the



New distribution transformer

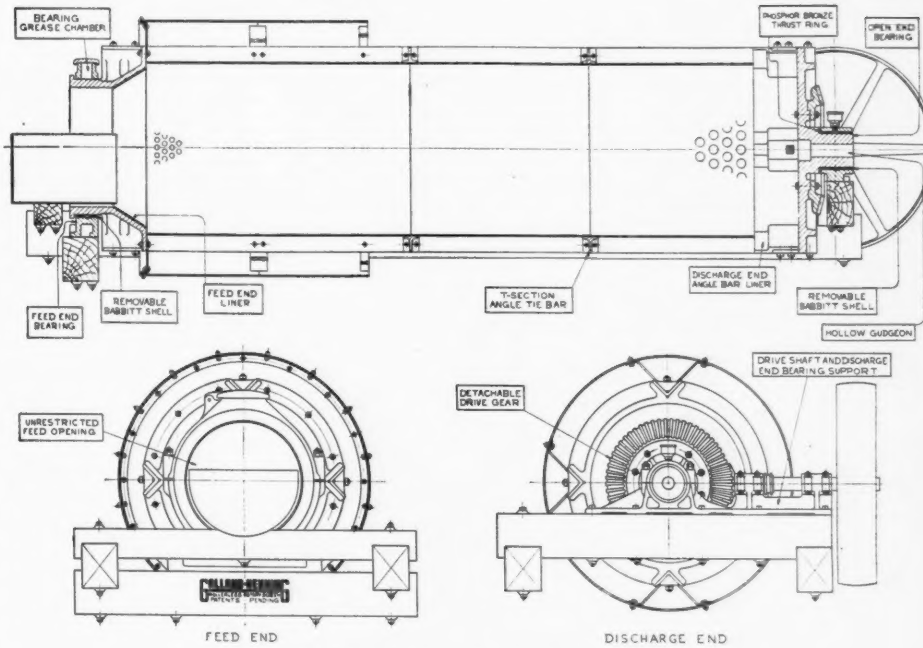
transformers may be made absolutely oil tight.

These characteristics make this transformer particularly applicable to various industrial usages and can be safely used on electric shovels, railway cars, trucks and other equipment where unusual vibration and rough usage must be withstood, the manufacturers say. Cement mills and lime plants where much dust may accumulate are examples of a need for this installation.

New Rollerless Rotary Screen

THE rollerless rotary screen manufactured by Galland-Henning Co., Milwaukee Wis., is unique in that it has no center shaft which is an obstruction, and at the same time it rotates in a single bearing at each end without the use of treadings or rollers. At the feed end the large diameter bearing provides an unrestricted feed opening. This type of bearing which is large in diameter but comparatively short in length is fitted with a removable habbitt shell in the lower half.

The other details of construction for this screen do not differ greatly from the usual design in use at this time. Some recent and notable installations have been made at the Grand Rapids Gravel Co., Grand Rapids, Mich., consisting of three 60-in. dia. screens; Arrow Sand and Gravel Co., Columbus, Ohio, four 60-in. dia. screens at the new plant recently completed; Dewey-Portland Cement Co., one 72-in. dia. by 28 ft. long at its new plant at Davenport, Iowa, and a number of screens at the various plants of the United States Gypsum Co. A number of installations have been made on dredges, the most important being one 60-in. in dia. and 30 ft. long equipped with two outer jackets which is mounted on a dredge at Cincinnati, Ohio, operated by T. J. Hall and Co. The screen was designed by Hugo W. Weimer, consulting engineer, Milwaukee, Wis.

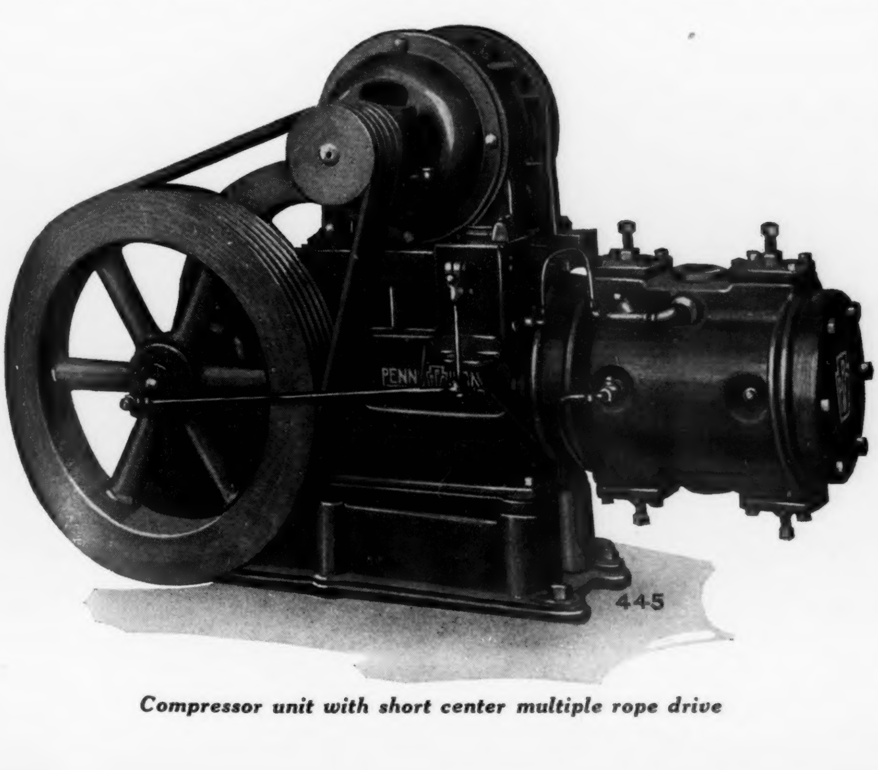


Plan and end sections of rollerless rotary screen

New Short Center Rope Drive for Air Compressor

THE Pennsylvania Pump and Compressor Co., Easton, Penn., has recently placed on the market a new arrangement for horizontal double acting compressors for use in places where floor space is limited. The drive used with the compressor units is the Allis-Chalmers multiple belt drive known as the "Texrope."

This arrangement eliminates the use of an idler and permits the motor to be set up immediately ahead of and close to the frame of the compressor. Where space is more limited, the motor may be mounted directly on top of the compressor frame as shown in the illustration. Compactness, inexpensive maintenance, high efficiency and quietness are among the features claimed for the new arrangement.



Compressor unit with short center multiple rope drive

Large Capacity Thickener

AN example of engineering progress and success in building large equipment to meet the increasing tonnage requirements of modern industry has come to light in the purchase recently of the largest Dorr thickener ever built. This Dorr thickener, which is of the traction type, is 325 ft. in diameter and some conception of its size may be obtained when it is realized that it will provide almost two acres of settling area. The machine has more than twice the capacity of any Dorr thickener built before. It will be used at the copper flotation plant of the Miami Copper Co., Miami, Ariz., for dewatering 16,000 tons of mill tailings and recovering for reuse in the plant about 11,500,000 gal. of water per day.

Conveyor Data Book

THE Link-Belt Conveyor Data Book, 615, issued by the Link-Belt Co., of Chicago, is a valuable treatise on conveyors. It is largely filled with tables from which all the details of a belt conveyor may be worked out. such as size of shafts and pulleys, horsepower required, capacities, and general dimensions. There are many engineering suggestions, well illustrated with charts and drawings. The book is very well printed on heavy paper and bound in leather.

New Bentonite Deposit Found in Mississippi

THE Jackson, Miss., *News* reports the finding of a deposit of bentonite near Aberdeen, Miss. Dr. E. N. Lowe, state geologist of Mississippi, is reported to have visited the deposit and found it to be of commercial size and the bentonite to be of a good grade.

Washington Ochre Deposits

THE Stevens county, Washington, clay or kaolin and ochre and sienna deposits are to be reopened, says a report in the *Colville* (Wash.) *Statesman Index.*

These deposits are located just north of Deer Park in Stevens county. A new and recent company has been incorporated, under the name of the Northwestern Clay and Color Works, main office in Deer Park, Wash.

The new company is reported to have rented the old plant known as the Artificial Stoneware plant. The money is to be raised by public subscription, and stock is now being offered for sale at $1 per share. The plant for the refining of the clay and ochre will be located at Deer Park, where the first unit, capable of refining 20 tons per day of the clay, will be installed. The orche and sienna will be developed later when the clay unit is in running order. The company has secured the services of a color and clay expert, who will have full charge of the operation and sales.

Incorporation articles were dated June 25 and show the following to be officers:

Almon Baker, Deer Park, Wash., president; Dr. John W. Lande, Goldendale, Wash., vice-president; W. C. Trowbridge, Goldendale, Wash., secretary-treasurer; W. J. Harper, Danville, Calif., color expert and general manager; M. G. Swanson, Deer Park, sales manager.

New York's Bad Lien Law

MATERIAL men and contractors are warned by Allen E. Beals in the *Dow Building Reports* that the New York mechanic's lien law is at least insufficient. He quotes one important contractor as saying:

"The present law is not a law at all; it is simply a farce, an open door through which dishonest persons have entered the building construction business wherein to practice fraud upon contractors and building material and supply companies."

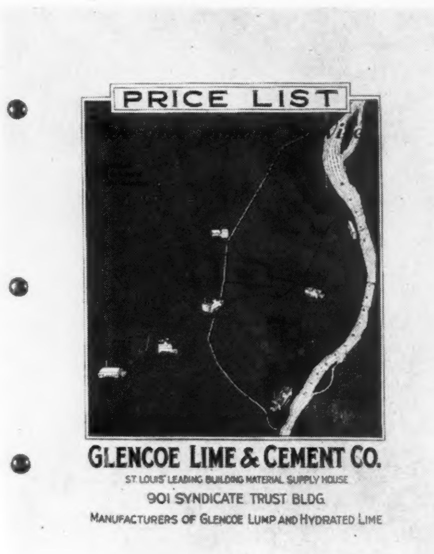
An example given is that a company bought land and made contracts to erect buildings with the understanding that when they received the money from the lending company they would, of course, pay the contractors for the work they did and the labor they supplied for the operation.

When the buildings were erected, however, and the owners received the money that should have gone to pay the contractors and for the materials and supplies that went into the job, the owners diverted these funds into other channels and as the situation now stands, the owners, under the protection of the lien laws of this state which are supposed to protect the material supply man and the employer of labor on building operations, will avoid payment on these items totaling more than $100,000.

The practice of defrauding material men and contractors is said to be growing. The law has been taken advantage of by those who, caught by a falling market, would have been forced into the bankruptcy court if they had not gone on building, borrowing money supposedly to pay for material and labor, and then diverting it to pay pressing accounts. And this has been done regardless of whether there was a demand for the finished structure or not.

Advertising Materials Through a Price List

THE Glencoe Lime and Cement Co., St. Louis, Mo., in addition to an extensive lime manufacturing operation, maintain one of the largest retail building material establishments in the St. Louis district. To facilitate sales, an attractive 40-page price list, in loose-leaf form, is distributed among prospective and active customers by the company. In this catalog are listed practically all the different kinds of materials used in the structural industry, both for large apartment or business buildings and ordinary dwellings. Some of the inserts illustrate the effects produced with various ornamental cements and plasters and contain data which



Materials price list which facilitates sales

are useful to contractors and others, and which are generally only to be found in handbooks or trade journal literature. The cover illustrated herewith shows a map of the district and the location of the seven distributing warehouses maintained by the company.

Glass Makers Ask Increase in Tariff

THE production of silica sand in the United States has been adversely affected by large foreign importations of glass during the past year Manufacturers of glass have already asked for an increase of the duty on glass and at a recent meeting of the manufacturers and representatives of the glass workers this request was backed up by a resolution passed by the workers.

"The extremely low valuations now placed on foreign glass products," said Congressman Frank Murphy, addressing the association, "are an injustice to American manufacturers. At the same time the American public does not profit, for they often pay as much or more for imported articles as they do for native ware just as good or better."

Reorganization of French Potash Company

IN March there was made public the fact that the Societe Commerciale des Potasses d'Alsace had been reorganized as a corporation with limited responsibility to be placed under the regime of the French laws. Under the terms of the new organization the object of the corporation is to effectuate on behalf of its constituent companies the sale of potash salts extracted from their mines and of the derivatives; the purchase and sale of salts or potash products of foreign extraction; the participation in commercial and industrial enterprises connected with potash production in France and abroad. The capital of the corporation is fixed at 1,000,000 francs, representing 10,000 shares of 100 francs each. Those associated are the French government, proprietor of the domanial potash mines of Alsace, the Mines of Kali Ste. Therese, and the Societes Minieres, organized under local law, Alex, Rodolphe and Rattenheim. Mr. Le Cornec, an engineer at Mulhouse, is named sole manager.—Consul John D. Johnson, Strasbourg, in *U. S. Foreign Commerce Reports.*

Pennsylvania Geological Survey Extends Field Work

THE Topographic and Geologic Survey of Pennsylvania is carrying on several other projects during the present field season in addition to the cooperative topographic work. Some of the works interesting to rock products operators include:

A popular report on the rocks of Pennsylvania, C. H. Ashley; Field work on building stones of Pennsylvania, R. W. Stone; Studies in the clay deposits of Pennsylvania of the Pittsburgh district, by Henry Leighton of the University of Pittsburgh, with field and laboratory studies by Prof. J. B. Shaw at State College; Aereal studies of the sand and gravel deposits of Pennsylvania, by Freeman Ward, Lafayette College; Detailed studies of slate west of Lehigh River, by C. H. Behre, Jr.

News of All the Industry

Incorporations

Reader Gravel Co., Lewisville, Ark., $50,000. J. B. Burton.

Silica Tile Co., Riverdale, Md. J. H. Weaver, John M. Ball and Olaf A. Nelson.

Mayer Marble Co., Carthage, Mo., $100,000. A. J. Mayer, Allen McReynolds and others.

Elcock Lime Products Corp., New York, N. Y., $10,000. G. Tiernan, 2 Rector St., New York.

National Gypsum Co., Buffalo, N. Y., has increased its capital from $2,500,000 to $5,000,000.

Conti Bros. Tile and Marble Co., Queens, N. Y., $5,000. J. E. Cameron of Richmond Hill.

Southeastern Minerals and Mining Co., Aiken, S. C., has increased capital from $5,000 to $30,000. Albert T. Maurice is president of the company.

Allis Sand and Gravel Co., Omaha, Neb., $100,000. Clyde W. Drew, Hans J. Peterson and Bernard P. Williams.

Moraine Asphalt Sand Corp., Dayton, Ohio, $10,000. Charles M. Peffler, Clifton Hollihan and E. B. Raymond.

Stein Sand and Gravel Co., San Gabriel, Calif., $50,000. Robert O. Stein, Henry McCormick and W. E. Gerard.

H. & H. Tile Co., Los Angeles, Calif., $30,000. Ord Hagerman, Virgil K. Halieman and Lucille Hagerman.

New Idlewild Products Manufacturing Co., Baldwin, Mich., $1,000. To manufacture cement building blocks, septic tanks, etc.

Gypsum Products Corp., Seattle, Wash., $400,000. George O. Gray, Kenneth McLeod, C. A. Riddle and R. V. Ankeny.

G. Y. Ralph Co., Inc., Hardwick, Vt., $50,000. To quarry, manufacture and deal in stone and stone products. George Y. Ralph, L. S. Robie, Melvin G. Morse, all of Hardwick, and Frank J. Stewart of Hyde Park.

Quarries

Georgia Marble Co., Jasper, Ga., is reported to be opening a quarry of green marble vein in Cherokee County.

Florida Rock Products Co., Brooksville, Fla., will reopen its plant about September 1, according to W. A. Kalls.

Logansport, Ind. A special session of the board of county commissioners has been called to discuss the purchase of a large stone crusher for county road work.

Coggins Wholesale Granite Corp., Atlanta, Ga., is making investigations and plans for developing the granite deposits near Carolton. B. F. Coggins is directing and financing the operation.

Oshkosh, Wis. Several meetings have been held recently by quarry owners in this section and the mayor of the town with the idea of fencing in quarry holes in the vicinity of the city so as to protect children from falling into them.

Sand and Gravel

J. W. Peters Sand and Gravel Co., Burlington, Wis., is erecting an office building.

Pioneer Sand and Gravel Co., Seattle, Wash., is erecting a new office and garage building to cost $35,000.

Brookhaven Gravel Co., Brookhaven, Miss., has contracted for the complete electrification of its pit and plant.

Jones-Scott Sand and Gravel Co., Umatilla, Ore., is constructing a washing plant in connection with its sand and gravel bunkers.

Gold Hill, Ore., has been chosen by the state highway engineers for their Roque river gravel crushing and washing operations.

Wolf Creek Sand and Gravel Co., Arcade Bldg., St. Louis, Mo., intends to add a dragline or an overhead cableway to its equipment.

York, Neb. The highway board of York county is securing options on gravel pits located in this district for the purpose of conserving the supply for future use.

Sidney, Iowa. R. P. Jones, F. J. Kling and C. A. Curtiss of the state highway commission are reported to be in Tremont county investigating the gravel and limestone deposits, with a view of starting new operations.

Rodgers Sand Co., Pittsburgh, Pa., is building a sand and gravel storage and distributing plant, equipped with elevating and conveying machinery. A repair and garage service building is also being erected to care for the 30 motor trucks in the company's fleet. The total cost of improvements is reported at $250,000.

Cement

Atlas Portland Cement Co. is reported to have recently acquired title to over 26 acres of land adjoining its clay and shale deposits in Eldred township, Penn.

Georgia Portland Cement Co. has been granted permission by the securities officials of the state of South Carolina to begin activities in that state. The company, organized about a year ago to build a $1,500,000 cement mill near Sandersville, Ga., is headed by J. Lee Hankinson, president; John C. Hagler, vice-president, and H. W. Neill, secretary and treasurer.

Northwest Portland Cement Co., Portland, Ore., has let a contract to the Riblet Tramway Co. of Spokane, Wash., for an aerial tramway to connect its limestone quarries and cement plant, which is now nearing completion at Grotto, Wash. The tramway is of the automatic type which requires one man to operate. The contract specifies that the capacity of the tramway shall be 90 tons per hour. The work is to be completed by October 15.

Cement Products

Stone Tile and Supply Corp., Knoxville, Tenn., has started operating its plant, manufacturing poured masonry units.

Gray Concrete Pipe Co., Thomasville, N. C., is reported about to build a temporary concrete pipe plant at Greensboro, N. C.

Walter T. Weaver, Birmingham, Ala., has received a permit to build a new 160x100-ft. concrete pipe plant. The plant will be of brick, frame and sheet metal construction.

Tyee Super-Flooring Co., Ltd., St. Boniface, Man., is installing a $4,000 tile-making machine which will increase the capacity of its plant. This company was formed last April to manufacture an asbestos composition flooring and, is said to have orders for several months in advance. Peter Tromm is manager of the company.

Gypsum

Michigan Gypsum Co.'s Grand Rapids mill was recently damaged to the extent of $40,000 by a fire started by an overheated electric motor.

British Columbia Gypsum Co., Ltd., is erecting a large addition to its plant at Liverpool, South Westminster, B. C., to provide increased facilities for the manufacture of plaster board. The building measures 250x50 ft. It will be of heavy mill frame construction.

Miscellaneous Rock Products

Johns-Manville Co., New York, it is reported, will soon start operating its new mill at Nashua, N. H., producing asbestos shingles and products.

Harvey M. Mansfield, 3332 Spruce St., Miami, Fla., intends to install a drying plant capable of drying 2000 tons of phosphate rock per day of 24 hours.

Calera Lime Works, Calera, Ala., recently completed the installation of a hydrating unit. Its plant, which is a Schulthess plant, made by the McGann Mfg. Co. of York, Penn., is being electrified and new tracks are being laid from the quarry to the mill.

Personals

Bert Crow, junior member of the firm of Crow & Son, owners of a gravel pit near Bluffton, Ind., was injured recently when struck by an iron pipe which fell from the hands of an employe who was working above him. He sustained a fracture of the wrist and cuts at the back of his neck.

M. B. Garber, for ten years with the Sanderson-Cyclone Drill Co., Orrville, Ohio, the last five of which he served as sales manager, has joined the sales organization of the Thew Shovel Co., Lorain, Ohio, to do special sales work in the quarry, sand and gravel, mining and railroad construction industries.

William E. Brown, manager of the central station department of the New York district of the General Electric Co., has been appointed New York district sales manager of the company, Theodore Beran, commercial vice president of the company, has announced. Mr. Brown's headquarters will be at 120 Broadway, New York.

John L. Senior, president of the consolidated Signal Mountain and Florida Portland Cement Cos. and the Cowham Engineering Co. of Chicago, Ill., in partnership with Francis P. Butler, former vice president of Peabody, Houghtaling & Co., has formed the firm of Butler, Senior & Co., with offices in Chicago, to carry on the investment department of the Cowham Engineering Co.

Fred C. Diebold, formerly superintendent, Buffalo Cement Co., is now the agent for Osgood steam, gasoline and electric shovels and cranes; General Excavator, ½-yd. gasoline and electric excavators; Smith concrete mixers and road pavers; Archer concrete hoisting and distributing systems; Domestic hoists, pumps and air compressors; Haiss truck loaders, conveyors and clamshell buckets; Vulcan steam, gasoline and electric locomotives; Seavrens road pavers and steel bins, with headquarters at 1745 Amherst St., Buffalo, N. Y.

Manufacturers

Philadelphia Gear Works announce that on September 1, 1927, it wil move into its new building at Erie Ave. and G Sts., Philadelphia, Penn.

American Cable Co., New York, announces that Charles A. Perryman, former sales manager of the wire rope department of the Wickwire Spencer Steel Co., Inc., has been appointed assistant sales manager for them, with headquarters at 105 Hudson St., New York City.

Mid-West Locomotive Works, Cincinnati, Ohio, announces the appointment of the following territorial representatives: James A. Ridgway, New York; H. E. McCoy Co., Pittsburgh; H. B. Owsley, operating as the Lakewood Equipment Co., St. Louis; Clare Osborn, Ltd., Montreal, Que.

Climax Engineering Co.'s Chicago, Ill., office has been moved to Room 1608 Harris Trust Bldg., 111 West Monroe St., in charge of F. E. Blanchard. The company also announces that the J. L. Latture Equipment Co. of Portland, Ore., representatives for Oregon, Washington and Idaho, have moved to 312-14 E. Madison St., Portland, Ore.

Chain Belt Co., Milwaukee, Wis., announces that Charles G. Olson, formerly of the main office, has been transferred to the Detroit office. Mr. Olson was connected with the sales department for several years before his transfer. He will look after the Rex chain and engineering business of the company in Detroit territory, with headquarters at the company's office at 8855 Woodward Avenue.

Earle Gear and Machine Co., with main office and plant at 4707 Stenton Avenue, Philadelphia, Penn., announces the opening of a New York district office at 95 Liberty St., New York City. C. N. Walsh and George E. Barrett are in charge. The company also maintains a district office in charge of Wm. H. Allen at 110 State Street, Boston, Mass.

G. H. Williams Co., bucket manufacturers with headquarters at Erie, Penn., announces that H. B. Ackland has been appointed manager of the New York territory, with office at 30 Church Street, New York City. Mr. Ackland succeeds E. L. Sparks, whose personal business has made it necessary to move to the Pacific coast. C. F. Weiblen has been appointed direct factory representative in the Ohio district, with headquarters in Cleveland.